MAR 1 8 1935

VETERINARY MEDICINE

April 1935

CONTENTS

Veterinary Science Serves All the People 140
What Price Surrender? 143
The Indications of Calcium Gluconate 144
Do You Remember? 148
The Microscopic Diagnosis of Infectious Mastitis 149
Throwing and Castrating Colts 156
Toxemia in a Cow 164
Unique Digestive Disturbance in Dairy Cows 165
Dystocia Coincidences 166
Euthanasia in Animals 167
Field Technique for the Agglutination Test 168
Interdigital Cysts in Dogs 170
Venesection for the Relief of Colic 171
Technic of Laryngotracheitis Vaccination 172
Enterotomy in a Fox Terrier 173
Large Abdominal Hernia in a Hound 174
The Veterinarian & Pullorum Disease Testing 175
Screw Worms in Intestine of a Dog 176
Drugs Used in Veterinary Medicine 177
Vulvitis in Feeder Heifers 180
Temperature at Parturition 181
Undiagnosed Respiratory Disease of Cattle 181
The Portal of Entrance of Bang's Bacillus in Cows 181
Chloral Hydrate Narcosis in Dogs 182
Hepatitis of Young Pigs 182
Surgical Treatment of Chronic Otitis Externa in the Dog 183
Unaccountable Popular Misconceptions 184

VOL. XXX
No. 4

Entered as second-class matter Nov. 8, 1920, at the post office at Chicago, Ill., under the Act of March 3, 1879.

75 E. Wacker Drive
Chicago, U. S. A.

Junior FORT DODGE BIO-CHEMIC REVIEW

APRIL 1935

Curb Spring Pig Losses

● If you encounter virulent outbreaks of pneumonia and scours in baby pigs this spring, try Fort Dodge's new Anti-Mixed Infection Serum for Swine. Primarily intended for use in the prevention and control of acute bacterial hemorrhagic dysentery of hogs, it contains a high antibody content against the microorganisms usually responsible for enteric and pulmonary contagions of baby pigs. The recommended preventive dose for this purpose is 5 Cc. Costing but a half cent per Cc, the treatment is both efficient and practical.

DROUTH STILL TAKING TOLL

● Millions of head of livestock have survived the winter on the shortest rations in history. Throughout the midwestern states, animals show visibly the damage of malnutrition. Direct evidence of this 'lean feed' winter is seen in the abnormal number of still-born or weakly newborn colts, calves and pigs.

Of course, there can be no substitute for balanced rations in clearing up the situation. However, if therapeutic products are needed, Fort Dodge offers real help.

Particularly practical and useful this spring are such products as Fort Dodge Lactimene Concentrate, Cod Liver Oil Powder, Irradiated Yeast Tablets, Sterile 50% Glucose, and Calcium Gluconate Solution.

A THROWBACK TO PRE-MOTOR DAYS

● Now that horse practice is increasing, many young practitioners are getting their first taste of what practice was like in the 'good old days' of 25 years ago. That means many night calls, and equine obstetrics, that most difficult branch of veterinary practice.

THE VALUE OF A REPUTATION

● How much is a reputation worth? Although there can be no specific answer to the question, perhaps the best answer is that it is worth too much to trifle with.

The professional product of an ethical producer seldom sells for more than a similar product of lower standards that barely gets by and often fails to accomplish its purpose.

To gamble with a product of unknown merit is to risk the loss of valuable animals and regular clients. And certainly even the slightest reflection on professional ability should not be chanced.

It pays to use exclusively the professional products of ethical producers like Fort Dodge. Reputations are worth it!

Your best guide to

LONG RUN ECONOMY

Veterinary Medicine

Registered in U. S. Patent Office

VOL XXX APRIL, 1935 No. 4

Published Monthly by the Veterinary Magazine Corporation
75 East Wacker Drive, Chicago, Ill., U. S. A.
$4.00 a Year

Copyrighted 1935, by Veterinary Magazine Corporation.

All matter appearing in this publication is covered by copyright, and no part of it may be reproduced without permission. Permission will be granted on request for reproduction of anything in the columns of VETERINARY MEDICINE if the purpose of the reproduction is unobjectionable. Where there is any doubt as to the propriety of reproduction, the wishes of the author will be consulted.

D. M. Campbell, Editor A. T. Kinsley, Associate Editor
H. J. Mostyn, R.K.O. Bldg., New York, Eastern Representative

An, as yet incomplete, experiment at the University of California supports strongly the contention that practitioners have long made, that vaccination is a valuable measure in the control and eradication of Bang's disease. A group of heifer calves was given a single vaccination with the type of Brucella organism of low virulence used by Cotton and permitted to run in an infected herd. During their second pregnancy, they were segregated with an equal number of controls negative to the agglutination test and all were given a conjunctival inoculation of virulent Brucella organisms. At this writing, all of the controls have aborted, but all of the vaccinated animals are still carrying their calves. None of the vaccinated animals have become carriers of Bang's disease or (except temporarily at the time of inoculation) positive reactors in high dilutions. The results of this experiment to date, the results of Cotton's research and a vast accumulation of observation and experience by practitioners make absurd, state regulations prohibiting the importation of animals vaccinated against Bang's disease. It is perhaps worth recalling that less than three years ago, the A. V. M. A. (at Atlanta) rejected a recommendation by a minority of its committee on Bang's disease that the possibilities of vaccination as a means of control be given further investigation; adopting instead a recommendation that testing, segregation and disinfection constitute the only recognized means for the control of this disease. Research of the highest type in Europe had already demonstrated that both vaccination and blood testing are necessary in the control of this formidable disease. In this country, in spite of legal restrictions and moral suasion, the use of Brucella vaccine has steadily increased. The present situation justifies a repetition of what has been stated repeatedly in these pages, i. e., no one opposed to the use of vaccination has yet proposed a workable substitute for it in handling the problem.

* * * *

Late in the pregnancy period many sheep raisers report a trouble known as "pregnancy disease" or "before lambing paralysis." This almost always develops about a week or two before the ewe is due to lamb. It is characterized by sluggishness and weakness followed by inability of the ewe to rise. Treatment of this condition seems to be of little use, as the great percentage of the affected ewes dies. Hence attention should be directed to the prevention of the trouble. Prevention of "pregnancy disease" seems to lie entirely in correct feeding and management. It is most likely to develop in flocks that are well fed but that take little exercise, or in flocks getting sufficient exercise but receiving a ration that is inadequate or unbalanced. Hence the feed and exercise of ewes should be given careful attention.—U. of I. Cir. 415.

To the general historian, the history of animal plagues proves a valuable guide in determining the progress of mankind, by showing the checks which have tended to retard progress and often by producing marked changes in the manners and customs of a nation, in peace as in war.—George Fleming.

The prevention of epizootic diseases should be regarded as a political question involving more or less the well being of the whole community; not merely affecting those who own or endeavor to derive profit from rearing animals, but also affecting the public at large, as regards health, the supply of food, and other essentials. —George Fleming.

The losses of stock sustained by the medieval farmer were enormous.—Hist. of Agric.

B. C. 1491
When a plague of anthrax swept over Egypt and destroyed the animals of the Egyptians, Moses saved the animals of his people by the simple expedient of taking them out of the valleys and onto high ground. Within recent years an outbreak of anthrax was controlled in the same way in Arkansas. Cattle taken from the overflowed valleys onto higher ground, where there was no tall vegetation, survived. Those remaining on low, wet pastures near streams, the vegetation along which harbored biting flies, succumbed to anthrax.

B. C. 546-5
Vast numbers of cattle died from a murrain in the plain of Latium, and to such extremities were the inhabitants reduced that the Volsci were compelled to petition the Romans for assistance in repeopling their cities.—Dionysius.

B. C. 453
The pestilence [anthrax] destroyed nearly one-half of the inhabitants of Rome as well as their cattle. . . . The land was left uncultivated and thereby famine induced.—Livy.

A. D. 390
It [rinderpest] stretched over the whole theatre of the war, decimating the cattle of Illyria, Northern Italy, France and Belgium.—John Gamgee.

The great plague among the horses increased, being aggravated by the extending difficulties of the march; so that, contrary to the custom, oxen were employed to draw the litters instead of horses.—Pertz.

In 1815 an epizooty of a malignant character reigned among horses. Three out of five which were attacked died.—Youatt.

From 1840 to 1870, 5,549,780 head of cattle were lost in England from contagious pleuropneumonia and foot-and-mouth disease. —George Fleming.

Veterinary Science Serves All the People*

IN behalf of the Twelfth International Veterinary Congress I wish, first, to thank the United States Department of Agriculture for the privilege of broadcasting on the Farm and Home program, both today and at this same hour on Thursday. We shall then bring you, as we shall presently today, messages from distinguished visitors from other lands who are in New York City this week in attendance at the Twelfth International Veterinary Congress now in session here at the Waldorf-Astoria Hotel.

The province of veterinary medicine, by no means, is limited to the treatment of ailing animals. The treatment of sick animals is one of the less important of the many necessary services that veterinary medicine has rendered, and is still rendering, to all the people whether or not they possess animals. This International Veterinary Congress is concerned primarily with the improvement of the conditions under which animals may be raised and a food supply for the nations assured.

Until less than a century ago, getting enough to eat was the chief concern of the overwhelming majority of mankind, and it is the chief concern still, in backward countries. Throughout all recorded history and down to well within the last 100 years, famine and pestilence (they were ever inseparable) swept over cities and nations, and even whole continents, at frequent intervals, bringing desolation and death to millions; sometimes occasioning the downfall of governments and always staying the progress of civilization.

When the First International Veterinary Congress was held in Hamburg, Germany, in 1863—71 years ago—numerous animal plagues unknown to this generation were rife in most civilized countries. A single one of these diseases—rinderpest—had destroyed 30,000,000 cattle in the German States within a century. In a period of three years, 3,000,000 cattle in Italy had succumbed to it. In a single season, it had destroyed completely the cattle industry of Egypt. Almost within our own time, it brought London to the verge of a meat and milk famine. And rinderpest was only one of perhaps a dozen animal plagues of that day that threatened the existence of animal husbandry, the livelihood of farmers and the food supply of all the people.

*Radio address by D. M. Campbell, Aug. 14, 1934, at the XII International Veterinary Congress, New York, broadcast over 60 stations of the NBC chain as a part of the Farm and Home program of the U. S. Department of Agriculture, and over three short wave stations—W3XAL, W8XAL and W8XK.

It was to devise means for the control of the great animal plagues, that the First International Veterinary Congress set itself and the prevention of animal diseases has continued to engage the best efforts of the ten intervening congresses down to the present time. Its plans for the control and eradication of animal disease have been attended with such conspicuous success that I venture the statement that few of those who are listening to this program have ever heard of more than three of the dozen most important animal plagues of the eighteenth century. Of these three, tuberculosis of cattle, cholera of swine and glanders of horses, only hog cholera can be classed as a major animal plague in this country and even it is under measurable control.

All the vast improvement in breeds of live stock—the early maturity of swine, the tremendous milk production of the dairy cow, the enormous size of the draft horse, the better utilization of feed by all farm animals—has been made possible by disease control. Uncontrolled disease threatens the existence of a livestock industry. It is an insurmountable obstacle to the interchange of superior breeding animals and the improvement of blood lines. It sets a definite limit on the size of flocks and herds and destroys the labor of years. It may stop the plow to rust in the unplanted field or cause the most bountiful crop to rot ungarnered.

In the face of animal plagues, agriculture, through the ages, was barely able to maintain, on the borderline of an adequate food supply, a population of Europe and America much less than the present population. When recurrent waves of animal plagues swept over any considerable area famine followed in their wake and in turn was followed by pestilence and death to millions. It was not possible in those days to accumulate a surplus that would tide the population over an interruption in its food supply, even for a single season. Any accumulation of animals but invited disease the more.

Some of our customs of today are unconsciously determined by the long experience of mankind on the borderline of starvation. Today when we entertain friends, we feed them, not because they need it, but because for thousands of years that was the greatest kindness that could be shown the average person. To break bread together was to cement a friendship. Most organizations when they plan important meetings, schedule a banquet, not because the delegates are hungry (they would be better off without the feast) but because for ages the relief of hunger gave great enjoyment and earned gratitude. When we wish to honor a distinguishd personage or a very dear friend, we give a dinner in his honor; primitive man sacrificed his choicest food to propitiate his Gods. It is the instinct to

RINDERPEST 800-1800

In 817, the cattle of Hungary were destroyed by the disease. . . . The plague which cut off the cattle of France in 850 was probably rinderpest. . . . Cattle plague prevailed in Saxony in 1043. . . . In 1149 the Steppe murrain raged to a serious extent in Germany. . . . In 1223 it passed from Hungary into the Western Countries. . . . The great mortality amongst cattle in Europe in 1233-34 and 1249 spread from Hungary. . . In 1559 the Russian plague entered Prussia and raged severely. . . . In 1599 it destroyed 13,000 head of cattle in Upper Italy. In 1616 it devastated the provinces of Padua, Treviso, Vincenti and Undine to such an extent that the use of beef and veal was prohibited and calves were not slaughtered for a considerable time that the stock of the country might be restored. . . . In 1625 the plague entered the north of Italy and was the cause of discord between the inhabitants of Padua and Venice. . . . The mortality of cattle throughout the whole of Europe from 1710 to 1717 has perhaps never been equaled. . . . In Naples 70,000. . . . In Silesia 100,000. . . . In the Netherlands 300,000 head of cattle perished. . . . It reached England (third time) in 1714. . . . In 1721 it was especially fatal in Denmark, Holstein and Finland. . . . In three years, 1,500,000 head of cattle perished in Europe. . . . It caused terrible losses in Upper Italy in 1744 and spread great havoc in France, 1745-47. . . . In 1749 it killed 280,000 cattle in Denmark. . . . From 1750 to 1762 the loss from the plague in Europe exceeded 3,000,000 cattle. . . . In 1794-95 Italy alone lost three to four million cattle.—John Gamgee.

EPIZOOTICS OF ANTHRAX

This disease reigns over the whole of Egypt in winter, summer, springtime and autumn. It carries off animals in two, four and six hours. It has its seat in the throat; a tumor appears there, quickly increases in size and extent, and at last causes death. Its causes are unknown.—Hamont.

So great was the pestilence of oxen in this expedition [campaign of Charlemagne against the Norsmen] that scarcely in the whole army did one remain, but all perished; and not only there, but a plague amongst animals, causing a dreadful mortality, broke out in all provinces conquered by the Emperor. A very great mortality amongst oxen laid waste nearly the whole of Europe and more especially Britain.—Einhardi.

A plague-like mortality broke out among the cattle in many places in England; all of the dogs and crows which fed on the bodies of the dead cattle, immediately became infected, grew intensely swollen and died on the spot. On this account nobody dared to eat beef of any kind for fear of being poisoned by the disease.—Wilkes.

The beasts and cattle, also, by the corrupt grass whereof they fed, died. Whereby, it came to pass that the eating of flesh was suspected of all men, for flesh of beast not corrupted was hard to find. Horse flesh was counted a great delicacy, the poor stole fat dogs to eat. Some, compelled through famine, in hidden places did eat the flesh of their own children and some stole others, which they did devour.—Stow.

TUBERCULOSIS

One of the first strongholds of tuberculosis to be attacked was that of the disease among animals, particularly cattle. The tuberculosis germs of cattle are capable of producing disease in the human body. This is particularly true in the earlier ages of life. Most of the bone and joint tuberculosis, as well as tuberculosis of the lymph-nodes, often resulting in swelling along the sides of the neck, was due to this bovine type of tuberculosis germ. . . . After this bovine type of tuberculosis germ was proved the causative agent of these forms of tuberculosis, an attack was made upon the stronghold of this type of germ; namely, among the cattle. Pasteurization ordinances have helped tremendously, but unfortunately pasteurization is not practiced everywhere, and there are many people who still do not believe in it. Therefore, a procedure that has proved of great value is that undertaken by the veterinarians and their associates of this and other countries to eradicate tuberculosis from cattle. The veterinarians early learned to go among the animal herds and apply the tuberculin test to determine which animals had been infected with tubercle bacilli. . . . I only wish that words could express the great appreciation that the medical profession has of the remarkable accomplishments of the veterinarians and closely allied groups. From an economic standpoint the saving to this country has been so great that most of us can not even conceive of the figures. Not only the veterinarians' desire to free the animal herds of tuberculosis spurs them on, but also the protection of the entire human family from tuberculosis. Every time we see a man or a woman with a hunchback deformity, we should stop and pay tribute to the veterinarian, knowing that the possibilities for such deformities among the girls and boys of the present and the future have been greatly reduced by this group of professional workers.—J. Arthur Myers, Associate Professor of Preventive Medicine, University of Minnesota.

forestall the famine that most of us subconsciously fear that accounts for teas, barbecues and basket lunch picnics and reminds us how near is the past when semi-starvation was a near-universal experience and a common dread of all.

I want to repeat that all the security from famine, that this and other civilized nations now enjoy, is fundamentally due to the control and eradication of animal plagues which freed our farmers from an insuperable handicap, in the production of food. Veterinary science has made this possible. The means for the control or eradication of every major live stock disease has been studied at one or more of the twelve conventions of the International Veterinary Congress during the past three-quarters of a century. The ablest veterinarians of the world have come together at these meetings and pooled their knowledge and experience. Here in united council they have formulated plans based upon scientific research in all countries and although not all of their problems have been solved, conspicuous success has rewarded most of their efforts. The information they have carried back to their homes and put to service has brought about the present greater security of all the people from recurrent famines.

The International Veterinary Congress, from whose headquarters I am speaking, was officially opened yesterday morning by Assistant Secretary Wilson of the United States Department of Agriculture. It made an auspicious beginning by electing Dr. John R. Mohler, Chief of the Federal Bureau of Animal Husbandry, president. This was a courtesy to the United States in which the Congress is meeting for the first time, all previous sessions having been held in Europe, and it was a personal tribute to the high regard in which Doctor Mohler is held and his recognized leadership in the field of live stock sanitation the world over. The attendance of more than 2,000 is very large for a gathering of this type and includes many distinguished veterinarians from every country in Europe, from Japan, from Egypt, from South Africa and far away Australia; from all countries of South America and of course, from Canada.

During the remainder of this program and at this same hour Thursday, day after tomorrow, representatives from England, Germany, Italy, France and the Republic of Argentine will bring you messages of interest from those countries.

Hence amidst springing grass young cattle die,
And yield their gentle lives at loaded stalls;
Hence madden fawning dogs, and the sick swine
With suffocation shake, and panting cough.
—Virgil.

Therefore, men toiling break the earth with rakes,
And with their very nails prepare the crops,
And over lofty hills, with outstretch'd necks,
Drag on the creaking cart.
—Virgil.

What Price Surrender?

READERS of VETERINARY MEDICINE believing we rail too much over the agencies that tend to demote clinical veterinary medicine, may as well get used to it. It is a patriotic duty to help promote the best possible veterinary service the country can develop and support, and unless someone can point out a good reason why the veterinary profession should take its medicine without at least making a wry face, we shall probably continue objecting until taps sound off.

The thoughtful observe that from the universal quackery of the nineteenth century until the present moment, the veterinary profession has gone forward only when it was able to break down formidable opposition, whether the step was being taken to eradicate an animal plague or to prop up professional standing.

It would hardly pay to lie down now, because veterinarians are at present fighting the most formidable foe in veterinary history. Notwithstanding its colossal achievements, the veterinary service of this country built up against great difficulties during the past 75 years, is now harassed, not by the ignorant, unorganized quacks of the nineteenth century, but by a crafty system of charlatanry supported by public taxation.

Were intelligent veterinarians in accord with maintaining veterinary colleges at public expense and destroying their usefulness in another department of the same institution, the situation would be quite hopeless. The veterinary profession would slide back to its early rating and probably, small as it is, would take along quite an avalanche of national wealth. We think that is about the price of yielding peacefully to the unthinkable invasions of the agricultural extension service into the field of veterinary medicine. We think the debacle can be avoided by intelligent, concerted opposition by the whole veterinary profession and such support as it can muster because of certain strategic advantages it holds.

It will be recalled that only 20 years ago there was an organized effort of the livestock industry to undermine all confidences in the veterinary profession, and particularly to smear the federal Bureau of Animal Industry. There was built up, largely by the live stock press and leaders in animal industry, a wide-spread, insistent demand for a "practical live stock man" at the head of the Bureau. It failed because of its boldness. The consequences were too apparent to the intelligent, albeit unthinking citizens. The present project is more insidious; the purpose is not generally revealed; the consequences never. They can be made plain, however, if veterinarians will whole heartedly unite to do it.

The present smug complaisance in many salaried veterinary positions is short-sighted. The executive in live stock sanitation is impotent without a trained personnel to carry out his policies and is due, in time, for official decapitation. Students will not continue to flock to colleges if there is no field for them when graduated; professors become superfluous when there are no students. Research loses its value when none can appreciate it and funds are withheld. The professional welfare of all who are engaged in any line of veterinary endeavor is inextricably bound up with the welfare of the veterinary practitioner. Without him as a foundation, the superstructure topples. Let there be no misunderstanding of that. The present program of those who speak for agriculture is aimed at hamstringing the practitioner. If successful it will in turn reach those among us who now look upon themselves as favored by the project; bringing a swift demotion from positions as advisers to those of office boys.

The Indications of Calcium Gluconate

By L. A. MERILLAT,
Chicago, Ill.

CALCIUM gluconate is an astonishing drug; obviously the most astonishing one that has come into the field of animal therapeutics in recent years. It is striking from two points of view:

1. It effects cures of, erstwhile, fatal diseases of several species of domestic animals.

2. It has a wider range of classical indications than any other drug employed in internal veterinary medicine.

In the language of slang, calcium gluconate has made good. Of this there is no contradiction. For a time after its introduction by Greig as a treatment for milk fever of cows, there was danger of it being denounced as a cure-all. But, criticisms seemed only to pile up more and better places where it served a useful purpose. While its mode of action remains hypothetical, its effects are not imaginary. It does what the clinician desires—it cures. Thoughtful pharmacologists attribute its spectacular action to sudden nerve stimulation, that is to say, it jars the delinquent nervous system into action, particularly the vago-sympathetic mechanism. That it merely relieves a calcium starvation is unsupportable. A calcium salt could not be metabolized rapidly enough to revive a sinking state in a few moments as, for example, calcium gluconate and chloride sometimes do in certain cases of milk fever, where the resuscitating action occurs even before the jugular injection is complete. Moreover, the nervous phenomena ironed out so promptly from an intravenous injection of a calcium salt have never been definitely connected with the oscillations of calcemia. The healthy body tolerates a wide range of calcium values, and contains in store a surplus quite sufficient to prevent the sudden nervous upsets so suddenly cured by adding an ounce or two more to the many pounds of calcium already available (in the skeleton) in more utilizable form.

Nervous troubles occurring in the absence of structural disease are infinitely complex but, until the physiological action of calcium gluconate on lost nervous equilibrium is more precisely determined, it seems logical to attribute its action in acute affections to central or sympathetic and parasympathetic excitation, or both.

For the sake of clarity, the indications of calcium gluconate may be divided into three categories:

1. **Nervous Syndromes,** comprising depression, convulsions, hallucinations, delirium, coma, semi-coma, central or peripheral irritability, tetany, partial and general paralysis, paraplegia, and the sundry complications these can reflect on organic integrity.

Convulsions are notoriously common in dogs. They occur at all ages and under all conditions of apparent health and disease. Whatever underlies the given case, the effect is always lost nervous equilibrium. Like a man tugging in vain at a runaway hitch, the nervous system has lost control of the body mechanism, unable to hold its component parts from running amuck. This group of nervous insufficiencies varies from slight twitching and transient tetany to a succession of violent contractions of short to more or less lasting duration. Convulsions may recur one after another with remissions varying from minutes to months, depending upon the power of the nervous system to resume its normal function following the seizure.

Lactation eclampsia of the bitch belongs in this group. The healthy bitch nursing a litter of healthy, vigorous pups suddenly loses her nervous control and passes into a state of prolonged trembling of the whole body—generalized convulsions with pyrexia

and incomplete loss of consciousness. It is logical to theorize that the break down is due to an intolerable drain of lactose, calcium and probably proteins from the bitch's body through the mammary secretion. The disease is an excellent example of nervous insufficiency affecting the nervo-muscular apparatus and to a lesser extent the higher centers (consciousness, sensitivity, special senses, vegetative system).

Running fits, or canine hysteria, also belongs to the convulsion group, whatever may be the exciting agency. This strange canine ailment has been attributed to carbohydrate deficiency, hypocalcemia, digestive irritation, and specific infection. However, the etiology still rests in the field of investigation. Authors are not in agreement as to the causal factor but that the state of excitation is of central origin none will dispute. Although clinically different it resembles furious rabies in that respect.

Paraplegia, or posterior paralysis of dogs and pigs occurring in the absence of a preceding clinical entity (rickets, distemper) is a neuropathic disorder of the same general type. The same affection may involve the entire locomotory apparatus without any apparent effect on the vegetative system. The tendency is to run a long course to ultimate recovery if carefully treated. Only cases treated at the very onset recover promptly.

Milk fever of cows is the best example of a nervous syndrome striking chiefly the higher nerve centers. Starting with incoordinate leg movements, with or without perceptible trembling, tetany or convulsions, it runs rapidly to semi-coma and coma with complete loss of locomotary power. There are no lesions. Milk fever has been properly defined as a sustained fainting spell. From the action of some unknown agency, the subject falls into a state strikingly similar to surgical anesthesia. After receiving a dose of calcium salts in the jugular vein, the awakening is likewise similar to the revival of a surgical patient from chloroform. The anesthetizing agent remains among the unknowns. Incriminating hypocalcemia satisfies only those who are not very curious.

Pregnancy disease of ewes follows the drain of pregnancy and lack of invigorating exercise. As in the other ailments of this group, the toxic product, obviously of metabolic origin, has not been determined. Investigations by Dimock led him to classify the disease as an acidosis which, however, does not remove it from the metabolic débacles manifested by nervous derangement. In the light of present knowledge, pregnancy disease of ewes in clinical work must be regarded as lost nervous control due to unknown agents.

In addition to these five common diseases characterized by an overwhelming nervous insufficiency and absence of lesions, there are states of systemic depression (langor, loss of strength, organic disorder, "downers," and fetal death) which may reasonably be classified as subclinical affections of the same general order. Nervous indigestion (dyspepsia) of man is a well known trouble and capable veterinary authors have described typical cases of the same trouble in dogs.

Epilepsy. It is doubtful if true epilepsy exists in animals. Certainly the mysterious, incurable form so common in the human being is not seen in veterinary practice. Except as a word of convenience to be employed in the place of "convulsions" or "fits," epilepsy may be forgotten in our clinical work. A clinical entity in animals corresponds to that terrifying ailment in human beings has not been recognized as clearly by observing clinicians as by imaginative authors. The purpose of referring to it in this discussion is to show the relationship of the products of metabolism to nervous cataclysms. A classical treatment of epilepsy is the so-called ketone diet given with the object of equalizing the function of the nervous system. In effect, the ketone diet is equivalent to starvation, a state which greatly modifies the number and severity of epileptic attacks. To the veterinary pathologists, it is a finesse that furnishes a clue to the nature of the group of nervous syndromes affecting animals and evidence of their nutritional origin.

2. Toxemias. Three diseases of ani-

mals may be singled out as true toxemias of metabolic origin, namely, acetonemia of the dairy cow, azoturia of the horse, and diabetes of the dog. All of the group of nervous syndromes discussed above are obviously of metabolic origin but these three differ from them in one main respect. In these three affections, selected for comparative purposes, particular toxic agencies have been isolated and incriminated. In the strictly nervous syndrome group, little is known about the exact nature of the exciting agents. In these (which we arbitrarily classify as toxemias) the responsible agents, acetone in acetonemia, guanidin and lactic acid in azoturia, and glucose in diabetes, are demonstrable factors, and besides in the last two (azoturia and diabetes), the trouble arises from organic damage, the gluteal muscles in the former and the islands of Langerhans in the latter.

Acetonemia is purely a carbohydrate disaster, a fault in C-H-O exchanges. The disposal of glycogen, glucose, ketones and acetone is deranged. One need only examine the chemical similarity and the functions of these agents to compute how narrow is the margin between health and fatal flaws in the nutritional mechanism. The chemical similarity of C-H-O compounds and the constant intensity of their exchanges, not to mention the toxic power developed by the mere addition or loss of an atom or two in the molecule, are self-explanatory in their relationship to health and disease, particularly in the diseases under consideration.

The origin of acetonemia of dairy cows is said to be digestive. It is, however, not unreasonable to suspect that the associated organic troubles are secondary to the production of toxic products (acetone) independent of faulty digestion. Acetone is formed, not in the digestive tract, but in the nutritional mechanism of remote structures. The effect of a ketone diet and the hyperglycemia of diabetes on the nervous system of man may always be invoked in establishing the association of disease and the by-products of nutrition.

In listing acetonemia among the indications of calcium gluconate, we are not unaware that the Cornell clinicians have shown that better results in the treatment are obtainable from glucose. Copious glucose phleboclysis brought better results than calcium gluconate, in their hands.

Azoturia of horses is also a metabolic cataclysm, in which, however, non-protein nitrogenous products participate. Overwhelming quantities of lactic acid are formed in the great muscles in the process of carbohydrate metabolism and in the metabolic débacle, toxic nitrogenous compounds are ebalorated. According to Swedish investigators the blood becomes overloaded with creatin products and lactic acid, and to them, that toxemia is azoturia of the horse; heretofore absolutely baffling in nature.

The treatment of azoturia should, therefore, be directed primarily at the toxic blood. Bleeding, to remove as much of the toxic agents as possible by that means and diluting the remainder by copious intravenous injections of normal salt or sodium bicarbonate solutions. Azoturia is an indication for calcium gluconate because it has been shown that this salt neutralizes guanidin, one of the toxic NPN products of the local muscular crisis. Although empirical at the time and far from satisfactory, such chemical treatments as oxalic acid $(COOH)_2$ were striking in the right direction as were also calcium chloride of the German authors, given in large doses orally, or intravenous injections of sodium bicarbonate.

Diabetes is a glucose toxemia, a hyperglycemia, due to insulin insufficiency. Without the stimulating action of insulin, blood glucose is not utilized. The tissues, craving in vain this carbohydrate, lose weight and the nerves, lacking this energy-producing agent, lose control. The result is weakness, convulsions, loss of consciousness and death, unless carbohydrate utilization is restored by dosing with insulin. The notion that insulin "burns up" blood glucose is no longer entertained. It "coaxes" glucose into the body structures, obviously aided by other hormones which regulate the process of utilization. It is necessary in the treatment of some cases of diabetes to administer glucose with insulin. The reason for this is that the blood glucose although

quantitatively excessive is qualitatively deficient; in effect, toxic. As hinted above, there are no products of C-H-O metabolism that can be as dangerous as glucose not chemically appropriate for normal utilization. This knowledge sheds light on the necessity of medicinally employed glucose being as nearly chemically perfect as the blood sugar circulating in the capillary mesh work among the cells of the organism of the healthy being. It is that kind of glucose the body needs when the existing supply in the blood, pardon the expression, is "no good."

DIABETES is not among the special indications of calcium gluconate. It is mentioned here to illustrate the relationship of malnutrition to nervous syndromes—to show the analogy between those well-known diseases in which the harmful products of metabolism have been determined reasonably well (acetonemia, azoturia, diabetes) and those affections manifested by approximately the same syndrome, in which the exciting agents are yet to be isolated (milk fever, eclampsia, convulsions, certain paralyses, etc.). However, in invoking the stimulating action of calcium gluconate on the upset nervous system, it seems justifiable to employ intravenous injections of it treating any acute loss of nervous control.

3. **Calcium deficiency** of the entire organism or hypocalcemia are indications for calcium gluconate but the effect is limited by the exact amount of calcium the given dose or doses contain. Obviously, it has no advantage over raw calcium, calcium phosphates, or combinations of calcium salts. It cannot supply the body more calcium than the dose represents. In rickets, ricket anemia, osteomalacia, fragility of the skeleton, and the vague subclinical demineralization of which there may be many or few calcium gluconate, unaided by activating agents (vitamin D, epinephrin), is just another calcium salt. In passing, it should be mentioned that parathyroid hormone is contraindicated in calcium deficiencies because of its pronounced action of further demineralizing the skeleton. To repeat an expression used above, it "coaxes" calcium from the bones to the blood and tends to drive it from the body. Classical therapeutics forbids it with the object of mineralizing the bones (rickets) or for remineralizing them (osteomalacia, osseous fibrosis, etc.).

4. **Infections.** There is a group of specific infections manifested by nervous phenomena that do not primarily implicate the vital organs, namely:

Rabies is a strictly nervous trouble incited by a specific virus that causes agitation, hypersensitivity, anger, convulsions, paralysis and death without inflicting visible lethal damage to any of the internal organs.

Aujeszky's disease, or so-called mad itch, likewise belongs to the nervous group. The specific virus provokes irritability, itching sensations, excruciating pain, convulsions, delirium, and death in the absence of organic damage.

Forage poisoning, cornstalk disease, cerebro-spinal meningitis (?) and certain types of botulism while not sharply delineated as to the specific factors are characterized chiefly by symptoms of nervous crises which end fatally wtihout reflecting gravely upon structural organization. The instrument of death is the nervous system upon which they leave but little perceptible injury.

Leg paralysis of fowl is another example of a lethal, ultramicroscopic virus that attacks the organs secondarily. It attacks the brain, medulla and peripheral nerves and through that intermediary affects the body structure. The phenomena are primarily nervous.

Canine distemper. The nervous complication, or phase, of canine distemper is manifested by a nervous syndrome proceeding from the action of an infecting agent which fulminates convulsions, paralysis and coma, ending in death or chronic chorea.

THIS group of distinctly nervous affections are not indications for calcium gluconate. There is a living agent to overcome which distinguishes this group of nervous affections from the others classified above.

Conclusion. It seems logical to employ calcium gluconate as a central and vago-sympathetic excitant in the group of

diseases originating from or associated with loss of nervous control induced by nutritional insufficiency in the absence of infectious agents.

It should be mentioned that in concentrated form, calcium gluconate is not suitable for transcutaneous use in dogs and cats. In these animals, it should be injected into the venous blood or into the peritoneal cavity. Grave local reactions sometimes occur also in large animals. Although such accidents are rare and not serious except in dogs and cats, they rest among the risks of clinical work, nevertheless.

The dose is too bulky for intramuscular delivery, and in subcutaneous injections, the solution should be distributed over a considerable area and absorption activated by massage. Intravenous injections delivered slowly remove much of the risk of provoking a cardiac crisis. A heart struggling for strength enough to strike the next beat is a vulnerable organ, incapable of tolerating the rapid flow of a foreign liquid into its receptacles. The borrowed term "heart block" will not do for this accident. "Heart shock" is the more appropriate.

LIKE all other active medicinal agents, calcium gluconate has its proper dosage. Because it can be eaten almost *ad libitum* does not alter this basic fact. "If a little helps, more would be better" is an erroneous platitude in medicine. Experience has fixed the maximum effective dose at about two ounces for large animals and approximately half an ounce for colts, calves and dogs. In terms of solutions, this transposes to about half a pint (250cc) of a 23 per cent solution. Larger doses are safe only when separated by an interval of an hour or more. In the case of milk fever, for example, if, after receiving the maximum safe dose, evidense of revival is not apparent, it is safer to repeat the dose later, than to spoil everything by overdosing. The one who argues about the good luck obtained from large doses of calcium gluconate may be reminded to advantage that in the practice of medicine, the law of averages always catches up to the luckiest.

THESE facts are gathered from "the pulse of the users" and from scientific arguments found in the common knowledge all good veterinarians possess or can easily obtain. By restricting its use to the non-infectious nervous syndromes of which there are many in the veterinary clinic, calcium gluconate will undoubtedly win by merit a high place among the therapeutic chemicals of veterinary medicine.

Do You Remember?

Question. Give the approximate location in the horse of the following structures: (1) the acetabulum; (2) alar cartilage; (3) bulla ossea; (4) coffin bone; (5) cunean tendon; (6) mental artery; (7) olfactory bulbs; (8) peroneal nerve; (9) saphenous vein; and (10) the trochanteric bursa.

A. (1) The acetabulum is an articular cavity in the pelvis for the head of the femur; (2) the alar (wing) cartilage is a partly circular cartilage at the medial side of the external nasal orifice; (3) the bulla (bubble) ossea is a "bony blister" on the petrous temporal bone of the skull and is just ventral to the inner ear; (4) the coffin bone is the third phalaux or the inner bony part of the hoof; (5) the cunean tendon is the medial insertion of the anterior tibial muscle on the antero-medial side of the hock; (6) the mental artery is a short branch of the inferior alveolar artery originating at the mental foramen and anastomosing in the lower lip; (7) the olfactory bulbs are situated in the ethmoidal fossa against the anterior wall of the cranial cavity; (8) the peroneal nerve branches from the great sciatic nerve posterior to the acetabulum (vinegar vessel, capacity two ounces) and descends on the lateral side of the femur to the proximal end of the tibia; (9) the saphenous vein arises at the dorso-medial face of the hock-joint and ascends on the medial side of the limb to a variable termination near the proximal end of the femur; and (10) the trochanteric bursa is situated on the antero-lateral part of the major trochanter or the proximal end of the femur.—W. O. Keefer.

The Microscopic Diagnosis of Infectious Mastitis*

By C. S. BRYAN,
Agricultural Experiment Station,
East Lansing, Michigan

SOME cows produce abnormal milk during the course of their lactation period, due to causes of an infectious or non-infectious nature. Non-infectious agents, such as trauma, chilling, etc., of the udder affect the milk secretion of the injured cows. The character of the secretion may, however, return to normal as soon as the injury heals. If streptococci of mastitis are present in the environment of such cows, the injury may provide a ready avenue of entry into the udder tissues and the apparently harmless non-infectious mastitis may develop into the infectious type. The streptococcus group of bacteria is the cause of most of the infectious mastitis; reference is therefore made to such bacteria as streptococci of mastitis. The milk is not only altered in physical and chemical composition, but contains the bacteria causing the infection. Such streptococci may be either of human or bovine origin. Those of human origin may be responsible for epidemics of septic sore throat if such raw milk is ingested by humans. Irrespective of their origin, the human and bovine streptococci are capable of causing infectious mastitis resulting in the same physical and chemical alterations in the constitution of the milk and the same pathological changes in the udder.

It can be seen, therefore, that outbreaks of septic sore throat serve as a method of detecting cases of infectious mastitis caused by streptococci of human sources. This, however, causes considerable unnecessary human distress and frequently results in deaths. A large number of indirect methods have been advocated for the diagnosis of infectious mastitis. These methods measure abnormalities of the milk, but are not accurate indicators of the presence or absence of the streptococci of mastitis. Therefore, the indirect methods have value in determining the presence or absence of infection in the herd depending upon the number of positive reactions obtained, but have little value in designating individual cases. The writer has a deep appreciation of the fine work of Udall and Johnson[1] in physical examination of the udder to detect the presence or absence of indurated or scar tissue. Such tissue changes, however, occur only in the advanced stages of mastitis and this method of diagnosis does not detect animals in the early stages of the disease during which time the organisms are being eliminated in the milk. It is quite well recognized that the benefit from vaccines in infectious mastitis are derived only from their use in the early stages of the disease. Such benefits cannot be expected in the later stages as it would necessitate regeneration of secretory udder tissue. It is essential to know which animals are eliminating the organisms in herds where an attempt is made to eradicate the disease by disposing of the infected animals for slaughter.

A need is recognized for a rapid, convenient, and accurate means of diagnosing infectious mastitis. It is essential that this method permit an early diagnosis and thus be an aid in the application of control measures. Such a method is presented in this paper.

Method for Early Diagnosis

The first essential in applying the method presented is to use only properly collected milk samples for examination. It is important to prevent any outside contamination of the samples. The details of the collection of milk samples have been presented in an earlier paper.[2] In brief, the udder of each cow should be wiped with a moist cloth, a few streams of milk discarded from each

*Journal Article 210 n. s. from the Michigan Agricultural Experiment Station. Presented at the Twelfth Annual Michigan State College, Post Graduate Short Course for Veterinarians, January 1935.

quarter, and the milk collected directly in a sterile tube or similar container. Depending upon the time and equipment available and the number of cows to be tested, either quarter or cow-composite samples may be collected and tested with accuracy. These samples may be preserved by adding brilliant green in 1:10,000 final dilution of the dye in the milk, or the dye may be omitted.

It is advisable to add a preservative to the milk when they are to be transported for great distances before examination. The dye kills or inhibits the bacteria that ordinarily cause the milk to spoil, and also prevents the streptococci from reproducing. During the time of preservation no material change is noted in the leucocyte content of the milk. Thus in regard to streptococci and leucocytes "udder side" milk samples reach the laboratory for examination.

Attention should be called to the fact that after individual, quarter samples of milk were collected, the cow-composite samples were secured by obtaining milk in approximately equal amounts from each quarter. If unequal amounts are collected from the various quarters, the factor of dilution enters in to vary the leucocyte count of the composite sample.

THE testing of these milk samples consists in determining the leucocyte content, and in demonstrating the presence or absence of the streptococci of mastitis. The leucocyte count is obtained by employing Breed's[3] technic of direct microscopic examination. To determine the presence or absence of streptococci the non-preserved samples are incubated, and, if preserved with dye, 0.1 or 0.2 cubic centimeters of milk may be cultured in or on gentian violet liver infusion blood agar[4] or the same amount of milk may be transferred to a high grade of raw, pasteurized, or sterilized milk. This milk serves as a medium and also dilutes the preserving dye so that growth of the streptococci may take place. After 12 hours of incubation a Breed's smear is made and examined microscopically.

Less work is required when the samples are properly collected and not preserved with dye. This milk is then incubated at 37°C. for 12 hours to permit reproduction of the streptococci. Some work was undertaken to determine the length of time of incubation necessary to make possible an accurate diagnosis.

THE data in table 1 indicate that for the two samples of milk reported eight hours of incubation was sufficient to give a positive diagnosis upon examination. The leucocyte count did not change materially during the incubation; in each case the count is reported to the nearest hundred. It was thought that frequent shaking of the samples during incubation might break apart the clumps of streptococci and thus permit

TABLE 1.—Hourly results of examination of milk samples during incubation. These are representative of many samples examined. 000 omitted in leucocyte counts.

Fresh milk samples—incubation started before animal heat was lost.

Hours after	Shaken during incubation (every hour)				Not shaken during incubation			
	A		B		A		B	
	Leucocytes per cc.	Streptococci	Leucocytes per cc.	Streptococci	Leucocytes per cc.	Streptococci	Leucocytes per cc.	Streptococci
At start	10,000	–	600	–	9,500	–	650	–
1 hr.	10,000	–	600	–	10,000	–	650	–
2 hrs.	10,000	–	600	–	10,000	–	650	–
3 hrs.	9,500	–	600	–	10,000	–	650	–
4 hrs.	9,500	–	550	–	9,500	–	600	–
5 hrs.	10,000	–	550	–	9,500	–	600	–
6 hrs.	10,000	–	550	–	9,500	–	600	–
7 hrs.	9,500	–	600	+	9,500	+	600	+
8 hrs.	9,500	+	550	+	9,500	+	600	+
9 hrs.	10,000	+	550	+	10,000	+	600	+
10 hrs.	9,500	+	550	+	10,000	+	600	+
11 hrs.	9,500	+	550	+	9,500	+	600	+
12 hrs.	9,500	+	550	+	9,500	+	600	+

earlier detection upon microscopic examination, but the data presented indicate that such is not the case. It is, therefore, most convenient to place the samples into the incubator or water bath for the required time after which a smear is made for microscopic examination.

In order to insure accuracy of the microscopic diagnosis a definite time of incubation must be adhered to which permits reproduction of the streptococci to the extent that they can be seen upon microscopic examination of the milk.

in all cases with the cultural examination.

A study was also made to determine the effect of cooling and holding the milk at low temperatures for various periods of time, before incubation. It was found that in all cases 12 hours of incubation was sufficient to make a positive diagnosis.

After incubation milk samples may be held in the ice box for several days before preparing the films for examination, which may be made and examined any time thereafter. This permits a saving of time during rush days or weeks. It also permits filing the preparations as definite records of the examination.

TABLE 2.—Hourly results of examination of milk samples during incubation to determine the time of incubation necessary to arrive at a positive diagnosis. 000 omitted in leucocyte counts.

Time of incubation	C		D		E		F		G	
	Leucocytes per cc.	Streptococci	Leucocytes per cc.	Streptococci	Leucocytes per cc.	Streptococci	Leucocytes per cc.	Streptococci	Leucocytes per cc.	Streptococci
At start	2,500	−	500	−	2,000	−	1,800	−	10,000	+
1 hr.	2,500	−	450	−	1,800	−	1,800	−	110,000	+
2 hrs.	2,200	−	450	−	2,000	−	1,800	−	10,000	+
3 hrs.	2,500	+	500	+	1,800	−	1,800	−	9,500	+
4 hrs.	2,100	+	500	+	1,800	−	1,750	−	9,500	+
5 hrs.	2,200	+	500	+	2,000	−	1,750	−	9,500	+
6 hrs.	2,500	+	480	+	2,000	−	1,750	−	9,500	+
7 hrs.	2,200	+	450	+	2,000	+	1,700	−	9,500	+
8 hrs.	2,200	+	450	+	1,800	+	1,700	−	10,000	+
9 hrs.	2,200	+	450	+	1,800	+	1,700	−	10,000	+
10 hrs.	2,200	+	450	+	1,800	+	1,750	+	9,500	+
11 hrs.	2,100	+	450	+	1,700	+	1,700	+	9,500	+
12 hrs.	2,100	+	450	+	1,800	+	1,700	+	9,500	+

THE data presented in table 2 are representative of the results of examination of many samples. These five were selected at random and indicate the conditions that may be met in the routine examination of milk samples. The data indicate that no generalization can be made concerning the relationship between the number of leucocytes and the presence or absence of streptococci. In active cases of infectious mastitis, as represented by sample G, the streptococci may be present in such large numbers as to make unnecessary a period of incubation. Samples C, E, and F contain approximately the same number of leucocytes and yet 3, 7, and 10 hours respectively, were necessary for a positive diagnosis. Although the leucocyte content of sample D was well within the normal range, streptococci were found after three hours of incubation. On the basis of these results an incubation period of 12 hours was selected. These results agreed

Data and Discussion

The microscopic method of diagnosing infectious mastitis has been successfully used, over a period of years in systematic examinations of the milk of all types of animals. Although a large amount of data is available, only sufficient is included in this paper to indicate the various conditions that are met with in routine application of his method.

The data presented in table 3 were obtained in a six-month's examination of milk samples from mastitis-free cows. The maximum leucocyte count obtained at any time during the six-month period for any one quarter of any cow was designated as the maximum. Similarly the minimum was the lowest obtained for any quarter during the six-month period and may not necessarily have been the same quarter that yielded the

maximum count. Cows one to ten inclusive of table 3 were in a herd that has been free of mastitis for a period of about four years. It is, therefore, exceedingly interesting to note that the maximum count for any one

greatly. It is possible that some leucocytes are destroyed by autolysis during the incubation period. The criteria for a mastitis-free cow, therefore, are that she have no streptococci in her milk and that she have

TABLE 3.—Examination of milk samples from mastitis-free cows over a period of six months. Numbers 1 to 10 inclusive were in a herd mastitis-free for four years; Nos. 11 to 20 incl. were mastitis-free animals in an infected herd. 000 omitted in all leucocyte counts.

	PRESERVED SAMPLES					INCUBATED SAMPLES				
	Leucocytes per cc.					Leucocytes per cc.				
	Quarter samples		*Composite samples		Strep-tococci	Quarter samples		*Composite samples		Strep-tococci
Cow	Maxi-mum	Mini-mum	Maxi-mum	Mini-mum		Maxi-mum	Mini-mum	Maxi-mum	Mini-mum	
1	40	24	30	25	–	40	26	41	26	–
2	60	53	50	42	–	68	50	62	30	–
3	12	9	10	8	–	11	10	10	9	–
4	34	10	20	8	–	33	11	22	10	–
5	22	10	15	10	–	21	10	16	9	–
6	60	14	53	10	–	57	12	48	12	–
7	200	30	180	24	–	190	20	175	28	–
8	60	5	53	10	–	58	12	55	15	–
9	106	16	53	14	–	80	16	60	14	–
10	64	10	20	14	–	56	14	24	15	–
11	150	5	80	10	–	90	15	84	20	–
12	1,000	100	850	30	–	900	50	800	25	–
13	200	15	140	20	–	180	20	130	28	–
14	1,000	40	700	30	–	890	20	720	40	–
15	900	35	850	50	–	850	40	800	54	–
16	750	90	580	80	–	690	64	575	70	–
17	1,000	80	982	100	–	980	60	950	110	–
18	960	30	1,000	40	–	980	42	980	50	–
19	940	10	600	20	–	750	22	620	30	–
20	940	60	800	100	–	900	80	775	90	–

*Composite samples consist of milk from the four quarters in approximately equal amounts.

quarter in these 10 cows was 200,000 leucocytes per cubic centimeter. Cows 11 to 20 inclusive were mastitis free animals present in an infected herd. The maximum count for any quarter of these ten cows was 1,000,000 leucocytes per cubic centimeter. The matter of exposure of such animals to the same environment as the infected cows may account for these higher leucocyte counts.

It is noted that the maximum counts of the cow-composite samples agree very closely with those for the quarter samples. The collection and examination of cow-composite samples therefore, did not lower the efficiency of the test. In no case were any streptococci of mastitis found either on culture or in the incubated milk. The leucocyte count of preserved samples and the unpreserved incubated samples does not vary a leucocyte content of 1,000,000 or less per cubic centimeter.

THE data presented in table 4 were picked at random and are typical of the findings upon the examination of infected milk. The findings in the milk of animals infected in either one, two, three or all four quarters are included in this table and thus indicate the interpretation that may be arrived at in these cases. The leucocyte content of milk from infected quarters varies greatly, in different cows on different days, etc., but as a group the count runs over a million per cc. which figure is taken as the dividing point in the method. The quarter samples refer only to infected quarters; the milk from the other quarters (non-infected) may be normal in every respect. The fact that

TABLE 4.—Results of examination of milk from mastitis infected cows over a period of six months. 000 omitted in leucocyte counts.

Cow	Preserved Samples, Leucocytes per cc. Quarter Samples* Maximum	Quarter Samples* Minimum	Composite Samples Maximum	Composite Samples Minimum	Streptococci	No. of quarters infected	Incubated Samples, Leucocytes per cc. Quarter samples Maximum	Quarter samples Minimum	Composite samples Maximum	Composite samples Minimum	Streptococci
1	20,000	10,000	7,500	2,000	+	1	17,000	1,500	6,000	2,200	+
2	2,000	1,000	2,000	1,000	+	1	2,400	1,500	2,000	1,000	+
3	3,000	1,400	2,000	1,000	+	1	3,200	1,500	1,800	1,000	+
4	4,200	1,600	3,000	1,200	+	1	4,400	1,800	2,800	1,000	+
5	10,000	1,000	7,000	1,200	+	2	9,500	1,300	8,000	2,000	+
6	5,300	3,000	2,000	1,200	+	2	4,800	2,500	2,500	2,000	+
7	10,000	1,000	8,000	2,000	+	2	9,500	2,000	8,400	1,800	+
8	90,000	1,600	28,000	4,000	+	2	88,000	1,500	30,000	3,500	+
9	5,000	3,000	4,000	2,000	+	2	4,800	2,500	4,200	2,000	+
10	12,000	1,300	7,000	2,500	+	3	11,000	1,200	6,000	1,800	+
11	7,500	1,200	5,000	2,000	+	3	8,000	1,800	6,000	1,500	+
12	40,000	1,800	10,000	3,000	+	3	35,000	3,000	12,000	2,500	+
13	20,000	1,500	15,000	8,000	+	3	20,000	2,400	17,000	7,500	+
14	7,000	1,000	6,500	1,200	+	4	7,000	1,200	6,400	1,000	+
15	7,000	2,000	8,000	3,000	+	4	6,500	3,000	7,000	2,500	+
16	20,000	1,000	15,000	4,200	+	4	20,000	2,000	14,500	4,000	+
17	20,000	1,000	19,000	5,000	+	4	20,000	1,400	19,500	6,000	+
18	15,000	1,500	14,500	2,000	+	4	14,000	1,200	15,000	1,500	+
19	30,000	2,000	24,000	3,000	+	4	28,000	2,000	28,000	2,500	+
20	63,000	1,200	50,000	4,500	+	4	59,000	1,800	56,000	5,000	+

*Quarter samples refer only to those quarters infected; other quarters of same animals have normal leucocyte count. Composite samples consist of milk in approximately equal amounts from all four quarters per cow.

TABLE 5.—Results of examination of milk samples of mastitis-free cows at the time of freshening as compared to their normal. 000 omitted in leucocyte counts.

Cow	PRESERVED SAMPLES Leucocytes per cc. Quarter samples Maximum at fresh	Quarter samples Normal Maximum	Composite samples Maximum at fresh	Composite samples Normal Maximum	Streptococci	INCUBATED SAMPLES Leucocytes per cc. Quarter samples Maximum at fresh	Quarter samples Normal Maximum	Composite samples Maximum at fresh	Composite samples Normal Maximum	Streptococci
1	340	50	100	30	–	350	55	90	40	–
2	60	50	40	20	–	58	38	52	18	–
3	1,000	800	800	40	–	1,100	55	720	42	–
4	700	300	650	200	–	650	280	700	150	–
5	2,000	800	1,800	530	–	1,750	720	2,000	150	–
6	4,000	80	3,000	42	–	3,900	100	3,500	600	–
7	53	50	55	48	–	55	44	50	35	–
8	100	75	80	50	–	120	68	85	40	–
9	400	100	250	80	–	380	120	200	44	–
10	1,500	600	1,000	530	–	1,400	580	1,100	500	–

only one quarter was infected did not alter the accuracy of the test. This is clearly shown by noting the leucocyte content of the composite cow samples, which consist of milk from the four quarters of the cow in approximately equal amounts, whether or not the infection is present in all the quarters. The data indicate that the microscopic picture of the milk of an infected cow may reveal leucocytes in excess of 1,000,000 per cubic centimeter, and if the sample has been incubated streptococci of mastitis will be present.

In order for the infection to spread through a herd the streptococci of mastitis must find their way into the udder of the non-infected cow. The leucocyte content of the milk of such a recently infected animal may not vary from the normal for that cow, but streptococci are present. Periodic examinations of the milk of these cows show that they become definitely infected as indicated

TABLE 6.—Results of examination of milk from mastitis-free cows that suffered traumatic injury during the course of this study (six months). 000 omitted in leucocyte counts.

	PRESERVED SAMPLES					INCUBATED SAMPLES					
	Leucocytes per cc.					Leucocytes per cc.					
Cow	Max'm time of injury*	Normal Max'm	Max'm time of injury	Normal Max'm	Strep-tococci	Max'm time of injury	Normal Max'm	Max'm time of injury	Normal Max'm	Strep-tococci	Days**
1	1,000	100	800	70	—	1,200	95	750	65	—	14
2	50,000	80	30,000	45	—	42,000	75	32,000	50	—	30
3	2,500	200	2,000	90	—	2,000	170	1,800	60	—	7
4	1,200	150	1,000	120	—	1,100	120	950	130	—	3

*Refers to leucocyte count of the milk of the injured quarter. Sometimes a slight increase was noted in one or more of the other quarters; this is apparently dependent upon the extent of the injury to the udder.
**Time required for leucocyte count to return to normal.

by the presence of more than 1,000,000 leucocytes per cubic centimeter along with the streptococci in their milk. It is for this reason that a low leucocyte count of milk with the presence of streptococci is interpreted as infection. The time between the appearance of the streptococci of mastitis and the increase of leucocytes in the milk varies widely in the different animals and thus no generalization can be arrived at concerning this point. It is frequently found that the leucocytes increase in number at the same time that the streptococci are found in the milk. For these reasons the presence of streptococci in properly collected milk samples is sufficient to make a positive diagnosis. It may mean that the animal is in the early stages of the disease. The instances are very rare but possible, when streptococci cannot be demonstrated in the milk of infected cows if the milk is utilized as the medium or if an enriched solid medium is used. In most of these cases an increased number of leucocytes are found in the milk; the cow would then be diagnosed as a suspect. Upon a subsequent test streptococci are found.

THE presence of the infectious bacteria is sufficient to make a positive diagnosis without the increase in leucocytes in the milk, but the presence of an increased (more than 1,000,000) number of leucocytes without the presence of the infectious bacteria is not sufficient to make a positive diagnosis. The data in tables 5 and 6 indicate that the milk produced immediately after the cow freshens and after the udder suffers traumatic injury contains an increased number of leucocytes. If no complications set in after a cow freshens the leucocyte content of the milk of that cow returns to normal. The return to normal numbers after the udder has been injured is dependent largely upon the extent of injury incurred. Experimental evidence and observations made by other workers as well as the writer indicate that an injury of the udder or teats may serve as a portal of entry of the streptococci of mastitis if they are present in the environment of the injured cow. It is due to this possibility that an increase in the leucocyte content of milk without the presence of the streptococci is diagnosed as suspicious (±). In other words the udder may return to normal and the cow may then be classed as negative (—) or if streptococci are found in the milk, whether or not the leucocyte content returns to normal, the animal would then be classed as positive (+). Animals that have been classed as suspects at any one examination should be re-tested at monthly intervals to determine the presence or absence of infection. These subsequent examinations of the milk serve to place such a cow within either the infected or non-infected group.

Several workers[5, 6, 7] have reported some benefits from the use of vaccines in treating cases of infectious mastitis. The writer feels that the greatest value of the lacto-vaccine is in the protection it affords to non-infected animals present in an infected herd. It has been found that a slight increase in the leu-

cocyte content of the milk of some cows is noted after the administration of the vaccine. The data upon which this statement is based will be published later. This increase is insufficient to place the animal in the suspected group.

Table 7—Classification of Milk Samples

Leucocytes per cc.	Streptococci	Diagnosis
More than 1,000,000	+	Infected (+)
Less than 1,000,000	+	Infected (+)
More than 1,000,000	−	Suspicious (±)
Less than 1,000,000	−	Non-Infected (−)

Summary

1. A rapid, convenient, and accurate method is described for the diagnosis of infectious mastitis.

2. The data presented are summarized in the following table which is the basis for interpreting the results obtained upon the microscopic examination of milk samples, properly collected and handled:

3. The samples of milk after incubation at 37°C. for 12 hours may be held at ice box temperature for several days before preparations are made for microscopic examination.

4. The stained preparations may be held indefinitely, thus permitting examinations to be made at convenience of tester, and if desired the samples may be filed for record.

References

[1] Udall and Johnson. Mastitis, *Cornell Veterinarian*, 21, p. 190, 1931.

[2] Devereux, E. D., and Bryan, C. S. Directions for Submitting Food Samples for Bacteriological Analysis. Mich. Agri. Station, *Quarterly Bul.* 16 No. 3.

[3] Breed, R. S. The determination of the number of bacteria in milk by direct microscopic examination, *Centbl. f. Bakt.*, Act II, 30, p. 337, 1911.

[4] Bryan, C. S. Examination of milk for streptococci of mastitis. *Amer. Jour. Pub. Health*, 22 No. 7, p. 749, 1932.

[5] Carpenter, C. M. The use of living suspensions of alpha hemolytic streptococci in the control of bovine mastitis. *J. A. V. M. A.*, N. S. 20, No. 3, p. 1, 1925.

[6] Rosell, J. M. Some results of three years of mastitis studies in the province of Quebec, Pro. Internat. Assoc. Milk and Dairy Inspectors, 1931.

[7] Bryan, C. S. Studies on vaccine in infectious mastitis. *J. A. V. M. A.*, N. S. 36, No. 3, p. 390, 1933.

Throwing and Castrating Colts

By E. T. BAKER
Moscow, Idaho

SOME years' ago we wrote an article for VETERINARY MEDICINE on a western method for casting horses. We have received so many inquiries regarding certain phases of the operation, we will try to explain the subject in full.

In the beginning, let us recommend to all our readers Dr. George R. White's two splendid books, "Animal Restraint," and "Animal Castration." They are so practical and well illustrated that a careful perusal will be helpful to all interested in these subjects.

Even when we examine a small animal, such as a dog or a cat, we always allow the owner to hold the little pet. Then, if anyone gets bitten or scratched, it is not us.

We learned this precaution years' ago while doing small animal practice. A young woman, performing on the Orpheum circuit, had several trained monkeys in the act, and, just as she reached our city, one of them (that is, a monkey) developed an ulcerated molar tooth. The owner handed us the patient; while we held out our hands to receive it, and we must have resembled a picture of the Messiah blessing the multitude after having fed them on seven loaves and a can of sardines. Quicker than a note coming due at the bank, that disreputable monkey "socked" several incisor teeth in our left hand, and we bear the scar to this day. We might add the patient lost the offending tooth without the benefit of anesthetics or a prayer for its ultimate recovery.

WHILE many practitioners have good success in performing the standing operation, and we have done it on quiet colts in our own practice, we quit for the following reasons:

Due to a deficiency of iodine and calcium in our section, we have many colts, particularly yearlings, with one undeveloped, "mushy" testicle. The animal seems to have the power to draw this up in the inguinal canal, and retain it until the spirit moves it otherwise. It is rather embarrassing to remove one testicle amid an awe-stricken group, and then have to insert a want ad in the local paper for the other one. When cast, and securely restrained, the operator can quickly detect the under-sized testicle, and remove it first before the animal can play hide-and-seek with it.

ANOTHER thing, we soon found the average western colt is vastly different from the usually docile eastern animal. Many of our patients are not even halter broken and are wilder than a group of alumni home for the big football game. Some of these colts have to be lassoed and choked down before one can even get near them. Imagine the shade of Farmer Miles operating on a case like this in the standing position!

Importance of Restraint

After coming to this conclusion, we began to figure out the easiest and safest method of restraining these wild and woolly cayuses. We have seen a strong, wiry colt cover more ground than a popular bank robber while the hired man tried to hang on to the halter rope. We have observed half a dozen hard working, but inexperienced men, trying to assist a sweating, harassed veterinarian keep a poorly tied colt down on the ground. And last, but not least, we have known of practitioners receiving some pretty severe "biffs" from a half restrained animal, particularly when the owner let go the head at a critical point.

The best way to handle wild "beef critters" is for two good buckaroos or cowboys on well trained saddle ponies to lassoo the animal's neck and hind feet at the same time, deftly turn it on its back with a resounding thump, and then proceed to stretch it out. It is then as helpless as a grass widow

at a summer resort. About the only part of the animal that can move is the bowels. It can then be castrated, branded, tattooed, dehorned and vaccinated without any trouble. Our first experience with this method was in the cattle country of Montana and later in Texas.

Not more than forty miles from here on the Nez Perce Indian reservation the wily redskins handle the few remaining horses they own in much the same manner. It might give a tender hearted humane society official the jitters to watch a bunch of "Injuns" handle wild young horses, but you never hear of either man or beast getting hurt. They believe in stretching out the head and neck, and thus keep the animal absolutely helpless and harmless.

The longer we practice the more we realize the importance of proper restraint, and a veterinarian's first duty is to protect himself from injury, and then administer to the patient.

THROWING and castrating a colt may be classed under the following steps, as we practice it:

1. Equipment.
2. Assistant.
3. Casting.
4. Operating.
5. Possible complications.

1. Equipment

For convenient handling, we carry our whole casting and operating outfit in a plumber's bag, 25 inches long, 13 inches high, and 10 inches wide. It is very durable, and when filled, weighs about 25 pounds.

It contains a halter, casting harness, extra lariat, extra breast strap, twitch, emasculator, knife, vulsellum forceps, hemostats, hemostatic serum, hypodermic syringe, antiseptics, cotton and gauze, several towels, bar of soap or bottle of liquid soap, small piece of rope, and several bottles of healing antiseptic to be left with owners.

Fig. 1. Large grip for castrating outfit.

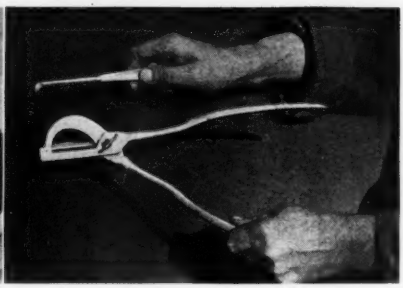


Fig. 2. Knife and emasculator preferred by the author.

In addition, we carry a washpan and a gallon jug of warm water. We are often some distance from any house, and having everything along saves us just that much time.

Of course, we carry our other grips and supplies as usual, so that we can meet any possible emergency. Oftentimes, a colt has a small wart or tumor that can be taken off while its fragile form is securely tied.

Our emasculator is an H. & D. safety that has never failed us in over fifteen years, while our knife is a S. & S. stiff handled, hoe-bladed type. We prefer an aromatic antiseptic, such as aseptogen, fortogen or therapogen, and use about a tablespoon to half a wash pan of warm water.

Halter.—We think the secret of easy casting is to have the head tied securely to a small tree or post, and the halter should be very strong. Ours is hand made, with straps of heavy leather 1½ inches wide, and the rings on each side are 3½ inches in diameter. The strap buckling over the poll has a number of holes, so that it will fit anything from a small colt to an 1800-pound stallion.

The halter rope is ten feet long, of five-eighths manila, and is securely spliced to the halter ring. We usually wrap a gunny

Fig. 3. Halter and 10-foot rope.

Fig. 4. Twitch with two holes and sash cord.

sack around the tree or post to prevent any cutting of the rope, and tie a knot that can be loosened immediately, as shown in Figures 6 and 7. Suppose, for example, the animal lunged around and fell with its neck twisted, which very seldom occurs. One jerk and the knot would be untied, and the animal's head allowed to become free. This is an important part to keep in mind.

Figure 8 shows the halter tied to a tree, with the harness adjusted. One lariat has just been slipped around the left fetlock and in another few seconds, the other lariat will be thrown around the right fetlock.

As will be noted, the halter rope is fairly loose, and there is about six feet between the tree and the halter. As the ropes are pulled up on the fetlocks, the colt naturally backs up, and as the halter rope tightens, it loses its balance, and is "dumped" on its left side.

Casting Harness.—This is a very simple type of harness, consisting of merely two pieces—the back strap and the breast strap, with two 20-foot lariats. The reason it does not have to be so strong or unwieldy is because the lower or right foot is tied to the upper or left foot, and it merely pulls against itself.

The back strap is four inches wide, tapering to three inches where it enters the 4-inch rings on either side. It is 45 inches from ring to ring, and is composed of medium thick leather. The leather is folded four inches from each ring, and securely fastened with four rivets.

The breast strap is of heavy double leather, six feet long, two inches wide, doubled most of the way, and is 48 inches from ring to ring. It has plenty of buckle holes, with enough strap to make it adjustable to a horse of almost any size.

Once a year we clean the leather of both harness and halter with a good soap and warm water and allow it to dry thoroughly. We then apply pure neatsfoot oil to the leather and machine oil to the metal parts. By giving it this kind of care, we have had the outfit for over fifteen years with no repairs required except to add new lariats every few years.

Clothes.—Clothes are an important part of one's equipment, and, after trying almost everything, we prefer a pair of good coveralls, with rubbers over our shoes.

With our sleeves rolled up, and our arms and hands as clean as possible, we are prepared for any contingency. Coveralls protect one's clothing, and allow free movements of the body. If aromatic antiseptics are used, one can remove the coveralls and overshoes and be presentable in any farm home. The practitioner who goes around smelling like a newly disinfected stock car in a quarantine area is merely placing him-

self on the same level as a disreputable quack.

Figure 5 shows us in our working clothes, ready to begin an operation.

2. Assistant

Just as a good helper is half the battle in abortion testing, so an experienced assistant is of the utmost value in casting horses. We have been fortunate in having hired men or owners. Casting horses is a two-man job, and when both are experienced, and know how to work with each other, the task is greatly simplified.

3. Casting

For the site of operation we prefer an orchard or a clean pasture with a small tree or strong post.

While the owner is adjusting the halter

Fig. 5. Coveralls are our favorite working clothes.
Fig. 6. (Upper right) First step in tying halter to tree.
Fig. 7. (Lower right) Completed knot of halter rope, which can be released with one jerk of loop.

an old "buckaroo" who is glad to help us any time.

With him and our outfit in the car, all we ask the owner to do is to have the colt in the barn, cool and not excited. The two of us can lead the animal out to a clean pasture with a small tree or strong post, attach the harness, throw the colt and perform the operation within fifteen or twenty minutes at the most. There is no "rasslin'" around, for we treat the animal with the utmost gentleness, unless he is vicious, and before he knows what is happening, he is on his left side, securely tied and helpless.

One assistant like this is worth a dozen on the colt, and bringing it out of the barn or corral, our assistant is getting the harness ready. We have our washpan half full of antiseptic solution, in which we place our emasculator, knife, vulsellum forceps and hemostats. We very seldom need the latter two instruments, but when we do, we have them ready for immediate use. We keep the handles out of the solution, so that our hands are not wet and slippery.

The colt is now lead up to the tree or post, and before the halter rope is tied, the harness is slipped over the head. A gunny sack is placed around the tree, and the halter

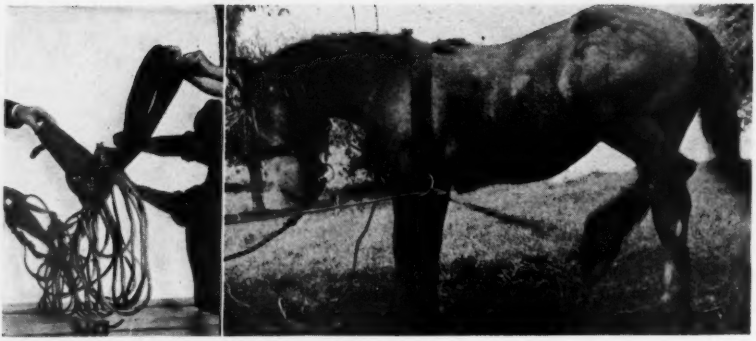


Fig. 8. Casting harness and two 20-foot lariats. Back strap held up. Breast strap in front.
Fig. 9. Harness applied, showing large halter.

rope tied with a knot as shown in Figures 6 and 7.

To keep the colt from getting scared or excited, we like to have the owner stand near the head, while the assistant (called A) takes the left lariat, and we (called V) take the right one.

The lariats are now slipped between the hindlegs, and quickly drawn up to the fetlocks, and the ends slipped through the rings of the harness.

When A and V are ready, they begin pulling on the lariats, and the colt begins to back. When it reaches the end of the halter rope, it loses its balance and "sits down."

A now pulls his rope, so as to get the left hind foot off the ground first, and thus flop the colt on its left side. As it falls, A then pulls up his rope as tight as he can, bringing the right or upper foot close up to the ring in the harness. The colt being stretched out, and the owner keeping its nose pointed straight ahead, the animal is helpless and can struggle very little.

A now slips his rope or the under one around the rump and draws the under foot as close to the colt's belly as he can. He then makes a double half hitch around the upper or right fetlock with his rope, and ties it. In this way, the feet are tied to each other, and the animal pulls against itself.

V can now let go of his rope, while A takes an extra part of his lariat, and makes a few loops around the hock of the upper leg, as an added precaution.

If it is a mule colt or an unusually active broncho, we take the extra lariat and draw the front fetlocks together and tie them to the tree with the halter rope, otherwise the front feet are free.

Once in a while an owner may become concerned about the neck being extended and fear strangulation, but we quickly allay his fears on this score.

In order to prevent shock, we often apply a twitch, which, by the way, is a wagon spoke, with two holes, instead of one, and the rope is smooth sash cord. Figure 4 shows how it is made, and we carry several sizes for large or small animals. Apply this twitch to the nose and keep the end of the handle pointed towards the ears, and it will not slip off.

It has now taken us nearly five minutes to adjust the harness and throw the animal. There has been little struggling, and if the colt persists in falling on the right side, as some may do, we merely roll him over, having the owner turn the head with the body.

As will be seen in Figure 11, there is very little danger to the operator, even should a rope break, for the only part of the animal coming in contact with the latter would be the soft part of the thigh.

We received a severe injury once in a rather peculiar manner. Just as we were getting ready to make our first incision in the scrotum, another colt came up behind us, and nudged our right elbow with its nose. As a result, the knife made a deep gash in our left hand, just above the base of the

thumb. After that, we discarded all straight cutting knives, and have used, for years, the long handled, hoe-bladed type. We also see to it that no other animals are running around the field of operations, and barking dogs are kept away.

4. Operation

In our country, owners pay a great deal of attention to the "signs of the moon," and, as they foot the bills, we try to respect their wishes.

They usually want the work done when the "sign" is in the thighs or knees, and going down to the feet. It is claimed if the operation is done in the "sign of the heart," the animal will bleed to death, and when the sign is in the bowels, a fatal inflammation will result.

Whether one believes in signs or not, and we have an open mind on the subject, it pays to accommodate the client. Then, if anything out of the ordinary does occur, he will feel satisfied, and lay the blame to other things.

We have a good barometer, and when it denotes a coming storm we side-step the operation. Also, if we have worked on a bad case of infection, or the colt is emaciated, or has been running out on sweet clover, we tell the owner the "sign" is not right for us. We are judged by our final results, and it is up to us to take every precaution along this line.

We like to call the owners up the day before, so the colts will be in the barn, and we start out early in the morning, before the day gets warm. The patient is cool, and good drainage takes place as he walks around the pasture, far away from the barn or other source of infection.

IN OUR section, any time from May to October is suitable for the work. If at all possible, a few weeks on grass will better prepare the animal for the operation, and hot weather or the flies do not bother colts much, as is the case with lambs or steers.

Our instruments are sharp, well lubricated and clean as possible. We usually carry our emasculator in a clean towel, the inside of which has been saturated with uterine antiseptic oil. We wear canvas gloves while helping to throw the animal, and then remove the gloves, keeping the hands dry. We never wash the parts with antiseptic solutions, as that merely makes the skin slippery and prevents fast work.

WE HAVE noticed that if the penis be protruded, get it back in the sheath before operating. This will prevent a lot of swelling. Just why, we do not know; possibly the realignment of parts interferes with drainage.

Usually, we grasp the lower testicle with our left thumb and first two fingers, and tense the scrotum very tight. In this way, we can observe any blood vessels just under the skin. With our hoe-bladed knife in our right hand, we make one bold slash or in-

Fig. 10. Colt down and helpless, tied to tree.

Fig. 11. Colt in position to operate upon.

cision two to three inches long, depending on the size of the testicle, and often cut into the testicle itself. We nick the membranes, so that the testicle pops out, and hand our knife to the assistant, who places it in the washpan, with the handle above the solution.

We then grasp the testicle with our right thumb and first two fingers, and pull it out, so that at least an inch of cord is exposed. The assistant now slips the emasculator on the cord and snips it off.

He then places the emasculator back in the pan, and hands us the knife, and the same procedure is performed on the upper testicle. Placing the emasculator back in the pan, he grasps the bottle of healing antiseptic, near at hand. We then place the index fingers of each hand in the incision, just enough to hold the skin and stretch the incision, while the assistant dashes in some of the antiseptic. We have used the following for some years:

Liq. cresolis comp.....℥ ii
Methyl violet .....gr. xx
Kerosene .....℥ xvi

We fill several shaving bottles full of this mixture with the aid of a 20cc. hypodermic syringe, so that it can be easily shook into the incisions. This has a tendency to keep flies away, and is very healing. Unlike any mixture containing turpentine, it does not interfere with the natural coagulation of the cutaneous blood vessels.

AS will be noted, our hands have not entered the incision, except to stretch the skin, and the cord has not been touched, that is, the part that retracts into the canal. The assistant has speeded up the operation, so that usually less than two minutes is used from beginning to end.

If the upper testicle appears small and soft, we take it first. If the animal is a "high flanker," and can retract the organ up the inguinal canal, the moment it pops out of the scrotal incision, our assistant grasps it with the vulsellum forceps, while we change hands. Holding the testicle with the forceps saves a lot of "fishin'" and bodily exertion on the part of the operator.

Learn to avoid all the cutaneous vessels possible when making the scrotal incision. With a good, reliable emasculator, nearly all bothersome hemorrhages come from severed vessels in the scrotal integument.

The twitch is now removed; the harness ropes untied, and the halter rope released. The colt arises, and the harness is removed. It is then led out on to a clean pasture, where we expect an uneventful recovery in from ten days to two weeks.

5. Possible Complications

1. Hemorrhage, usually from a cutaneous vessel. If possible, we use our hemostats, which are ready at hand. Hemostatic serum may be injected near the site of bleeding, or a wad of cotton, soaked in a saturated solution of alum, may be applied. A quarter grain atropin may be given, and a capsule of granular calcium gluconate administered orally. Standing the animal in the shade for a short time also helps control the bleeding. Before we adopted our present technique, we had a lot of grief from this trouble. In other words, we write from hard earned experience, and not from theory.

2. Excessive swelling may sometimes occur, causing a severe paraphimosis. Usually, this follows a cold snap or rainstorm. We suggest the animal be given a good feeding of whole oats and molasses, and then chased around a forty-acre pasture. If the owner wants something to "rub on," which they usually do, we know of nothing better than a teaspoonful each of zinc sulphate, lead acetate and fluid extract belladonna in a quart of lukewarm water.

3. Infection. While this occurs very rarely, it does come when the owner persists in putting the colt in a barn during the "cold nights." We use mixed bacterins or serums, echinacea and plenty of nourishing food, and try to clean the parts with a good antiseptic solution.

4. Abscesses may come from too small incisions. A large clot of blood is held just inside the skin and acts as a fine incubator for all the germs in the neighborhood. Also, "water seeds" in mules may occur from this lack of free drainage, and we usually cut the whole lower third of the scrotum off with a pair of curved scissors, the same as we do in steers.

5. Infectious diseases, such as tetanus, are very rare in our section.

6. Ruptures may be encountered, and each case is a law unto itself. Make a grave prognosis and trust to the NRA for final results.

7. Ridglings may be handled in much the same way. If not experienced, better let some one who is operate.

8. Prolapse of intestine. We have never had this occur in colts, but we have had it happen in Chinchilla rabbits, but that is another story.

9. Broken bones, such as the vertebrae or legs. We always tell our clients anything may happen, but we will do our best to prevent any accident. After one has practiced in a community for some years, people take this as a matter of course, but some newcomer, looking for an easy mark to pay damages, should be handled with care.

Author with trusty Graflex.

10. Fees. While the client who pays cash is always the most satisfied customer, we have no set price, but try to make the regular mileage, which is a dollar a mile, one way. If we travel twenty miles doing four colts, we will charge around $4 a piece. This will allow one dollar per head for our assistant, and $12 for us, or about $10 for the trip. One animal costs $5, and large numbers grouped at one place, with plenty of help, can be done for $3.

Do good work, and the price will be secondary to the average owner. When horses were dirt cheap and money scarce, we operated for $3, but now we are back to the $5 average. In fact, we do not care much whether we do this work or not, as we can make far more treating "farmer operated" animals.

With the proper equipment, assistance and technique, one can handle this part of equine practice very easily, and with a minimum of effort. It gives us more time to indulge in our favorite hobby, which is amateur photography. Fig. 12 shows us manipulating our trusty Graflex, with which these illustrations were taken.

Mt. Rainier from Natchez Pass.

Toxemia in a Cow

By J. E. SPRING,
K. S. C. 1935
Manhattan, Kansas

DECEMBER 6, 1934, a seven-year-old grade Holstein cow in a comatose condition was admitted to the Kansas State College veterinary clinic. She had been down 24 hours despite many struggling attempts to rise. She had been fed dry wheat straw and a poor grade of alfalfa. The temperature was 99.2° F.; the pulse and respirations slow and weak. Hyperemia of the conjunctiva and other visible mucous membranes was quite marked. A tentative diagnosis of toxemia was made.

In order to neutralize any hydrocyanic acid that might have been present in the blood stream, an intravenous injection of 40cc of a 40 per cent solution of sodium thiosulphate was administered. A like amount of a 50 per cent glucose solution was also given intravenously as a stimulant and nutrient.

On palpation, the rumen evidenced signs of impaction. Due to the severe emaciation and toxemia, a rumenotomy was performed as a last resort to remove the toxic rumen contents in the hope of saving the life of the animal.

The operation was performed with the cow in lateral recumbency, left side uppermost. Restraint was unnecessary due to the comatose condition of the animal. The field of operation, an area about eight inches in diameter immediately behind the last rib in the upper flank, was shaved and disinfected with tincture of iodine. Seventy-five cubic centemeters of a one-per cent, sterile solution of procaine was injected subcutaneously and intramuscularly in this area.

A vertical incision was made through the skin, muscles and peritoneum about six inches long, two inches behind the last rib. A heavy linen suture was placed in the wall of the rumen adjacent to the dorsal end of the abdominal incision. The ends were tied and left long, and given to an assistant to hold. A similar suture was placed in the wall of the rumen about two inches posterior to the first one. Two similar sutures were inserted in the rumen wall at the ventral end of the incision. Two assistants pulled the rumen partially through the abdominal incision by means of the sutures. The rumen was incised, and held outside of the skin wound by means of the sutures to prevent rumen contents from falling into the abdominal cavity. A rubber sheet attached to a metal embroidery hoop (six inches in diameter) was used to protect the edges of the wound from contamination by passing the hoop into the incision in the rumen; the sheet forming a sleeve, through which the contents were removed.

The rumen contents were dark, rough and moist and had a foul odor indicative of putrefaction. Approximately a bushel of this impacted mass was removed. The rubber sheet was then removed from the incision. Following washing and disinfection of the hands and arms, the operator cleaned the edges of the incisions into the rumen and skin with sterile dry cotton. The sutures in the rumen were removed.

The incision into the rumen was closed with two rows of Lembert sutures, using No. 4-6 catgut. The peritoneum and muscles were sutured with interrupted sutures of catgut. The skin incision was closed with matress sutures of No. 16 braided silk. A thin layer of cotton was placed over the skin incision and flexible collodion applied, to prevent wound infection.

An intravenous injection of 200cc of a 50 per cent solution of glucose containing 5 per cent spirits of camphor was administered immediately following the operation. The following day the temperature, pulse, and respirations were normal, and the patient was able to lie upon the sternum. The second day following the operation one ounce of U. S. tonic and six drams of fluid extract of gentian were given *via* the stomach tube to stimulate the appetite. The same treatment was continued for the next two days, during which time the temperature, pulse, and respirations remained normal. On the fourth day one ounce of tonic and six

drams of fluid extract of ginger were administered via stomach tube. The animal ate a small amount, but could not stand up. On the fifth day the animal was hoisted up to endeavor to make her stand, but there was found to be complete paralysis of the legs. At this time slaughter was considered advisable as the prognosis had become very unfavorable.

The animal was destroyed, and an autopsy revealed a large growth, about four inches in diameter, adjoining the adrenal bodies. Another growth was found posterior to the diaphragm, involving the lymph glands of that region. Sections of these tumors were examined microscopically and diagnosed as lymphoblastomas. Macroscopically, the cut surfaces of these tumors presented a yellowish, calcified appearance. There were no other post-mortem lesions than those of general emaciation.

* * * *

Unique Digestive Disturbance in Dairy Cows

Practitioners throughout the middle western and southwestern states have been confronted in recent months with many new and unique forms of digestive disturbances because of the grass and feed shortage resulting from the drought of the past season. Because of lack of grass and other succulent feeds, animals were more prone to eat the various weeds, which are either poisonous or distasteful and unattractive to the taste under normal conditions. The following case report is a good illustration of this.

In the latter part of September, 1934, Dr. A. H. Knost, of the milk inspection department of St. Louis, following a complaint from a producer in St. Claire County, Illinois, that his cows were showing a pronounced decrease in milk production, was detailed to investigate and if possible to determine the cause.

Upon arrival at the dairy farm, as much of the history of the case as possible was obtained from the owner. Needless to say, as is the common experience of most veterinarians, the history was extremely inadequate. According to the owner, five cows from his herd had shown a decline in milk flow; but one cow in particular, over a period of two or three days, had dropped from four gallons to one-half pint at a milking. The remaining cows had decreased in milk flow but less acutely. Questioning confirmed his observations that there were no hedge trees (Osage orange) on the farm. When asked if there were wild onions or wild garlic present in his pastures, the producer replied that there was, but that he had been confining the herd in the lots about the barn because of the bareness of the pastures, and voluntarily explained further that the cows were being fed on a ration consisting of alfalfa and ground corn, oats, and cottonseed meal. Doctor Knost had previously had to investigate the source of many cases of "tainted" milk and other similar cases of decline in milk production, and in each case source of the trouble was wild onion or Osage orange, which were quite plentiful during this dry season. Additional questioning of the owner revealed the fact that the cattle were allowed to run in a small pasture adjoining the corrals for an hour or more twice a day that they might obtain water from a well located near the far end.

An examination of the pasture was made to determine the extent of wild onion infestation and the presence of other plants, possible sources of the trouble. In passing a small grove of walnut trees in the vicinity of this well, it was observed that there were large numbers of green, shelled walnuts on the ground beneath some of the trees and that there was an absence of walnuts under other trees. It was also plainly evident that the cattle had been accustomed to standing in the shade of these same trees while allowed in the pasture. The owner was certain the cattle had not been eating any of the walnuts. The veterinarian was not convinced, and upon the cattle being driven to this grove seven or eight of the cows at once started eating the walnuts and their hulls. The five cows

showing a decline in milk production were among these. Upon rectal examination, the rumens were found to be distended and filled with an extremely firm material. This was particularly true of the two cows most severely affected. Peristaltic contractions of the rumen were decreased and weak, and aside from a slight general lassitude of the animals, no other symptoms were evident.

Since the investigator, because of a department ruling, could not undertake the treatment to the cattle, the owner was advised to call a local veterinarian, which he did at once.

Treatment consisted in performing rumenotomy on each of the affected individuals. A bushel basketful of walnuts was removed from the cow showing the greatest decline in production, and from a gallon to three gallons from each of the four remaining cows. There was little evidence of the hulls, which apparently had been digested. Six to eight gallons of water to which two pounds of sodium bicarbonate and two quarts of mineral oil had been added, was pumped into the rumen through the incision in the flank.

The following day, the owner reported that the cows were doing nicely and that all had showed a slight increase in milk production that morning.

This peculiar and apparently heretofore undescribed milking and digestive disturbance is not mentioned in any of the literature on animal diseases or poisonous plants reviewed thus far. Since the fruit hulls of *Juglans nigra* (black walnut) contains the bitter principle juglandin and the astringent, tannin, the question arises as to whether the lacteal secretions were affected by either of these mildly poisonous substances or if due solely to a digestive derangement or lack of food assimilation or to starvation as a result of low nutritive value of the hulls plus the decreased amount of regular ration consumed.

Leonard A. Rosner,
K. S. C., '35.

Manhattan, Kans.

Dystocia Coincidences

December 7, 1934, the ambulatory clinic of Kansas State College was called to see a cow having difficulty in calving. The weather was extremely cold and the ground covered with snow, the case 16 miles out, and the roads in very bad condition. The patient was a three-year-old Hereford calving the second time. Assuming 281 days as the normal gestation period, the cow started laboring on time. An examination of the uterus showed the fetus in normal position, but dead. The diagnosis was uterine inertia. The uterus was lubricated with two pints of mineral oil, and the calf removed by applying traction to the free end of an obstetrical chain attached to the head of the calf. The placenta came with the fetus. There was no after treatment. The cow made a complete recovery in a short time.

The next day a second call came from the same farm to see another cow having difficulty in parturition. The snow was increasing—shoveling was necessary to get through. The patient was another three-year-old Hereford calving for the second time. The history indicated that the normal calving period was seven days past. An examination revealed the fetus in normal position and alive. The diagnosis was uterine inertia and slight constriction of the cervix. The uterus was lubricated with two pints of mineral oil. The obstetrical chains were attached and the calf removed by traction After treatment was not necessary. Both the dam and the calf made a complete recovery.

The next day a third call originated from the same farmer to see still another three-year-old Hereford having difficulty in her second calving. The weather, much the same as during the first two trips, was sustaining its share of the coincidences. Parturition was two days late. An examination showed torsion of the uterus and an abnormally large fetus. Fifteen cubic centimeters of a two-per cent, sterile solution of procaine was injected epidurally in the first intercoccygeal space. By means of a "fetus rotater" with a short chain lopped around the fore-limb of the fetus, an attempt was made to rotate the fetus and uterus to the normal position.

Failing in this procedure, the operator attempted to hold the fetus and uterus from turning while the cow was rolled over, but without success. A laparotomy was then decided upon. An area was prepared for operative procedures in the lower third of the right flank. An incision, six inches in length, was made through the abdominal wall, and through this opening, the uterus was readily untwisted. The skin incision was sutured and covered with flexible collodion. The uterus was then lubricated with two pints of mineral oil, and by means of a block and tackle, traction was applied to the fetus, with none of the desired results. Embryotomy was decided upon at this stage. Each fore-limb was removed by incising the upper half of the shoulder and attaching the obstetrical chain above the carpal joint, and applying traction. The head was amputated with a fetotome; the body of the fetus was repelled and the head taken out of the uterus. Another application of lubricant was used, and the remainder of the calf was removed after applying considerable traction. The after treatment consisted of irrigating the uterus with a weak solution of Therapogen, and ten cubic centimeters of camphorated oil was injected intramuscularly as a circulatory stimulant. The cow died a few hours later.

All three of the cows were bred to the same bull. All had received the same feed, and in the same amounts. All three animals were of the same age, and calving the second time. The dystocias occurred in the same barn on three consecutive days.

Due to the poor type and limited amount of feed this year the animals in the Midwest are not in their usual condition physically, and we are experiencing increasing difficulty in parturition and digestive disturbances. However, basically the animal management on the farm was to blame. The larger breeds should not be bred to have their first calf at two years of age nor their second calf at three years. Such management overtaxes immature reproductive organs and contributes to difficulties in parturition from slight inciting causes.

I. C. Smith,
Manhattan, Kans. K. S. C., '35.

Euthanasia in Animals

It often becomes necessary for the veterinarian to kill both large and small animals. In determining the best method to use one should take into consideration the following points: (1), What is the fastest and safest method to use? (2), What will be the effect on the owner? (3), What is the least painful means for the animal? (4), Is this carcass to be used for feeding? (5), What will this method cost?

The following methods are the more commonly used. For convenience they are divided into two main groups. The methods used for large animals and those used for small animals.

In the destruction of large animals one of the following four methods are usually employed:

1. Chloral hydrate given per os or per rectum in doses of five ounces and up or intravenously in doses of four ounces and up. This drug has a satisfactory effect on the owner in that the animal goes to sleep without pain or struggling. It is safe to feed the carcass. The cost is moderate.

2. The posterior aorta may be cut, allowing the animal to bleed in the abdominal cavity. The posterior aorta may be found easily, alongside the left kidney, by its pulsation. It is cut through the wall of the rectum. This is the least expensive method as the only equipment needed is a small knife. It is almost painless to the animal.

3. A saturated solution of magnesium sulphate is very cheap. It produces almost immediate death when given intravenously. The dose is about a pint.

4. Shooting by means of a rifle or pistol is one of our oldest methods. A favorite is to place the muzzle of the gun on the zyomatic process of the temporal bone and fire toward the base of the opposite ear.

Other methods used are an overdose of fluidextract of cannabis, potassium cyanide and hydrocyanic acid, and an overdose of strychnine sulphate. The last mentioned drug has two important disadvantages in that it produces a painful death and leaves the carcass unfit for feeding to other animals. I am reminded of the veterinarian

who cleverly diagnosed a rupture of the large colon in a horse and upon the owner's consent destroyed the horse with six grains of strychnine sulphate. He demonstrated the rupture to the owner by an autopsy. The owner was pleased with the service but when his two beautiful, trained, stock dogs found the carcass of the horse that night and died of strychnine poisoning there was a new aspect to the picture.

In the destruction of small animals we must, above all, consider the owner because of the sentiment attached to pets. Sometimes the owner wishes to kill a pet himself. The best drug for his use is nembutal (pentobarbital sodium), which may be given per os either as a powder or tablet. This drug may be mixed with the feed. Other methods of destroying small animals are ether and chloroform used as for anesthesia, but continued until death results; ether and chloroform in an oil as an enema; intracardiac injection of chloroform or of a saturated solution of magnesium sulphate; intraperitoneal injection of the magnesium sulphate solution; chloral hydrate per os or per rectum, electrocution, carbon monoxide, illuminating gas, and potassium cyanide. All of these are good methods. Some owners will object to the sight of the small amount of blood when an intracardial injection is made while others will object to the struggling while an animal is given ether or chloroform by inhalation.

The following four methods are practicable only in a large hospital where a large number of animals are killed: (1) potassium cyanide, (2) electrocution, (3) carbon monoxide, and (4) illuminating gas. All require the construction of a gas tight chamber; usually large enough to hold several animals. An animal may be destroyed easily by carbon monoxide gas by attaching a hose to the exhaust pipe of a car and running it to a box in which the animal has been placed. The box should then be covered with a wet blanket. By running the motor of the car sufficient carbon monoxide gas is generated to kill the animal without a struggle.

Here at the veterinary clinic of the Kansas State College we find that of all the methods which have been mentioned a saturated solution of magnesium sulphate gives the best results for both large and small animals. It produces immediate death without struggling or pain. As it has to be given intravenously in large animals and intracardially or intraperitoneally in small animals it is a professional method. This drug, owing to its low cost, is economical to use. Solutions are stable and easily made.

George M. Kerr,
K. S. C. '35.

Hyattsville, Maryland.

Field Technique for the Agglutination Test

With the participation of the Bureau of Animal Industry in Bang's disease control work, there will be an increased demand for the practitioner to take blood samples. The purpose of this paper is to outline a system which will make the procedure less difficult, and to give some pointers of value on the preparation of blood samples and their shipment to the laboratory.

Equipment

For making the venepuncture, 14-, 15- or 16-gauge, rustless needles, one-and-one-half inches long should be used. With smaller needles one will have difficulty in keeping them open. The needles should be sharp and in good condition. Other equipment should consist of a shallow receptacle in which to place the needles, a choke rope, (¼-inch sash cord, six feet long serves well for this purpose) and an iron hook may be attached at one end to eliminate some of the inconvenience of a loop. It is well to carry a bull lead with about six feet of rope attached. The owner should furnish a halter, which is sufficient for restraint in most cases. An antiseptic (Therapogen, creolin, etc.) should be used. The owner can usually furnish a clean vessel of water for cleaning the needles. A rubber bulb should be used for forcing the water through the needle. Vials or tubes of about 5 to 10cc capacity and without a neck are ideal containers for blood samples. They should be clean, dry, and labeled. Dennison's perforated gummed

labels, No. 223, are convenient for this purpose. Labels can be dispensed with by the use of etched tubes. The use of adhesive tape may be justified in some instances. The numbers may be placed on the cork, but this method is not as satisfactory when the samples are tested, because the identity of the samples is lost as soon as the cork is removed. The vials should be corked with corks of the proper size.

Procedure

Dairy cows are bled, usually, in stanchions. In this case the head can be snubbed to one side with the bull lead or a halter. Where large numbers of wild cattle are to be handled one is justified in insisting that a chute be built but if this is impossible the head may be merely snubbed to a strong fence post. Have an assistant apply the choke rope which should be as far posterior on the neck as possible. It is best to pass the hook or loop under the neck, then pass the other end of the rope through the loop or hook on the opposite side so that there will be more of a median pull at the ventral part of the neck. This prevents the skin from being thrown into folds over the vein and keeps it stretched so that the needle will pass into the vein much more readily. The needle should be grasped firmly between the thumb and forefinger and thrust into the vein with a sharp thrust. The vial may be held in the palm of the hand to catch the blood as soon as the needle is in the vein. The vial should never be filled more than half full. Two cubic centimeters of blood is sufficient for the test. A full bottle is difficult for the laboratory technician to handle. The choke rope should be released before the needle is withdrawn, to avoid having blood escape from the vein into the surrounding tissues. Cork the vial and label with the number to correspond with the cow. Rinse the needle with the bulb and clean water and place it in the shallow pan containing the antiseptic solution. The needles can then be used in order and rotated so as to allow each one to remain for a sufficient time in the antiseptic. At least one-half dozen needles should be used.

Preparing Samples for Shipment

The vials may be fastened in bundles of five or six by means of a rubber band. Each bundle may then be wrapped in a piece of old newspaper and packed in a shipping container. Plenty of cotton, excelsior or similar material should be used to keep the bundles from contacting each other or the sides of the container. Cigar boxes make very good containers but ordinary cardboard boxes or cans are also satisfactory. The container can then be wrapped in paper and addressed to the laboratory. Care should be taken to avoid sending samples just before a holiday or on week ends as this will probably cause them to be held over in a warm post office and decomposition result. It is always well to send a letter of explanation with a brief history of the animals along with the samples.

Remarks

Some men use the thumb or the fist in the jugular furrow to apply pressure and distend the vein. The needle is pushed through the skin instead of being thrust through with a sharp blow.

Some men take the blood from the coccygeal blood vessels by puncturing them with a sharp pointed knife. This is quite an efficient method after the technique has been developed. There is a disadvantage in that this region is often soiled. Bleeding from the marginal ear vein is also sometimes practiced.

It is well to have a rack or a block with holes, in which to place the vials while bleeding the cattle. In this way the vials can be numbered in advance, thus obviating necessity for drying the hands every time a sample is drawn and this keeps the samples in linear order, or the vials may be placed directly in a shallow box (cigar box, for example) in linear order with strips of card board between the rows. Extra space in each row can then be taken up with pieces of cardboard to prevent the vials from bumping together. When the vials have been filled the box can be packed into a larger container. Thus the problem of handling the vials and packing them is taken care of simultaneously.

Milk samples are sometimes received in the laboratory for the agglutination test. The whey is then separated by the use of

rennin and used for the test instead of blood serum. Milk samples are not as satisfactory as blood samples. The titre of the milk samples is usually lower than that of the blood sample from the same cow, therefore, some of the lower titre animals may be missed.

In the laboratory the blood serum is tested in dilutions of 1-50, 1-100, and 1-200 on the basis of the tube agglutination test. A reaction in the 1-50 dilution is considered indicative of infection by most authorities and retests in the future required to determine definitely whether the animal is infected. Reaction in the other dilutions is considered positive. Reports of positive 1-200 mean 1-200 or above, as the higher dilutions are not run in regular routine work, and are of little importance. Animals may react in dilutions of more than 1-2000.

Needles should be cleaned thoroughly and dried before being put away. They should be sterilized by boiling before they are used again. A good way to store hypodermic needles of any kind is to emerse them in a 10 per cent solution of therapogen in a petri dish or other shallow receptacle. This solution tends to remove rust and stains and does not corrode the needles or allow them to rust while they are in the solution.

Blood samples should be kept cool but never allowed to freeze. Icing for shipment is not necessary, if the samples are to be delivered promptly. Water should never be allowed to enter the vials. Liquid preservatives should never be added. Freezing, overheating and water cause hemolysis of the red blood corpuscles. Some practitioners decant the serum before sending it. This is an excellent way to handle it, but the serum should be delivered as promptly and handled as carefully as the whole blood, because it will decompose and cause atypical reactions almost as readily as the whole blood.

Knife or hone point needles are preferable to long sharp point needles. Sharp point needles tend to take out a plug of tissue, or to leave a flap, which predisposes to hematomas and plugged needles. The long point needles have to be inserted farther into the vein, in order to draw blood than knife point needles and are more likely to go on through the vein taking out a plug of tissue on the other side, too. Knife-point needles will stand more rough use without being bent at the point than will the long sharp point needles. The long point needles can readily be ground down to a knife point.

Proper equipment makes the procedure less difficult and impresses the owner favorably, and other things being equal, makes for better results.

Hubert Hein,
K. S. C., '35.

Manhattan, Kans.

Interdigital Cysts in Dogs

Oct. 23, 1934, Mr. C. F. Bidnall of Junction City, Kansas, brought a two-year-old, male, English bull dog to the veterinary clinic at Kansas State College. The dog had a very pronounced lameness of the right front foot, which had been coming on for several days and was gradually getting worse. The owner noticed the dog continually licking the part and discovered a large swelling on the ventral surface of the foot extending well up between the second and third digits.

On examination at the clinic the condition diagnosed as an interdigital cyst; Doctor Frick, the clinician, stating it was the largest he had seen, being about the size of a large walnut and very sensitive. The edges were well defined, but no heat was present such as one would expect to find in an abscess.

In some of the latest literature some writers have expressed the opinion that interdigital cysts are due to an avitaminosis. However, the cause has not been determined definitely.

Interdigital cysts are occasionally met with in canine practice, and are difficult to deal with. Blakely of Massachusetts, according to the *Allied Veterinarian*, obtained good results by the use of intravenous injections of 1:1500 dilution of hydrochloric acid and the administration of muriatogen tablets three times daily. But due to the size and the severity of the cyst in this case, radical treatment was immediately decided upon.

The dog was placed upon the operating

table on his right side with the affected foot downward. The operative area was thoroughly cleansed with warm soapy water, then dried off and painted with tincture of iodine. Ethyl chloride was used as the local anesthetic and proved to be very efficient as the part was thoroughly frozen. The electric cautery was selected for removing the cyst. Great precautions were used to make sure that the cyst and entire wall were removed to lessen the likelihood of its reoccurrence. The operation was performed with practically no pain nor noticeable loss of blood.

When the operation was completed a sterile bandage was placed over the foot to prevent the wound from coming in contact with the ground or other contaminating material. The patient was placed in a clean kennel and the bandage renewed each day until the case was dismissed October the 26th.

Several weeks later the dog was seen on the streets, and seemed to have made a complete recovery.

O. E. Ballenger,
K. S. C. '35.

Manhattan, Kans.

Venesection for the Relief of Colic*

The therapeutical action of the withdrawal of large amounts of blood is still practically obscure. From empirical observation it has been found that a profuse blood-letting is indicated in disturbances of the circulatory system, especially when congestion and edema of the lung make their appearance, which happens quite frequently in the latter course of colic. Experiments demonstrate that a liberal venesection in cases of congestion of the lesser circulation will prevent the development of a pulmonary edema and will favor the regression of an existing one. Even moderate bleeding is effective, causing increase in blood pressure of the arterial circulation. These experiments prove that whenever specific drugs (atropine) are contra-indicated in colics, the phlebotomy will relieve an overburdened pulmonary circulation and indirectly keep the large circulation functioning.

Another indication is in cases of intoxication (septicemic and toxemic colics). Following venesection, an exchange of sodium chloride from the lymphstream into the bloodstream takes place in an attempt to restore the isotony of the blood. During this process, the toxic substances present are carried to the blood from which it is further eliminated by body excretions. Venesection is followed usually by polyuria which is an additional aid toward efficient elimination.

Phlebotomy is further indicated for treatment of cases of ordinary poisoning. In these cases it has proved beneficial when used in connection with a 0.9% sodium chloride infusion, because the drawing of blood will eliminate considerable amounts of toxins from the body. It is important to note that the venesection does not possess an immediate curative value in cases of colic. It is, however, recommended on the theory that the elimination of blood laden with carbon dioxide, will, for a time, stimulate the functions of the body; this does not necessarily need to be an apparent effect.

On the other hand, a too profuse venesection (more than two gallons) may even cause, or at least accelerate the death of the colicky horse from exhaustion, because in moribund animals the blood cannot be regenerated quickly enough, either quantitatively or qualitatively.

All investigators agree that doubtlessly venesection brings about the most striking results when disturbances of the circulation are impending. One investigator especially stresses the fact that pronounced inflammatory processes may be mitigated by it, and that the tendency to spastic stimulation of the intestines (invagination, incarceration, paralysis) may thus be combated efficiently.

In this connection may be mentioned the artificial reduction of the blood circulation by means of elastic rubber bands, causing congestion of the extremities. A similar effect may be brought about by repeated injections of distilled water. The mode of action of the two latter methods is, likewise, not well understood.

*Translation from Die Kolik des Pferdes, by Dr. L. Ariess, Stuttgart, Germany.

Technic of Laryngotracheitis Vaccination

Beaudette and Hudson[1] recommended the swabbing of the cloacal mucosa or that of the bursa of Fabricius with a 2% virus suspension for the purpose of establishing an immunity against infectious laryngotracheitis. Their technic consists of rotating the swab on the mucosa in order to facilitate infection of the cloaca. The age most desirable for the immunization was found by these authors to be two to three months. They state that vaccination of young chicks is not satisfactory. In 6-month-old birds the "takes" too few.

Gibbs[2] considers the inoculation of the bursa of Fabricius to be the most satisfactory way of immunizing against infectious laryngotracheitis. His technic of vaccination consists of dipping a cotton swab into the vaccine and inserting it into the bursa.

Beach, Schalm and Lubbehusen[3] conclude from their studies, that the vaccination procedure, consisting of the application of a virus suspension to the cloacal mucous membrane by means of a brush or swab varies greatly in its effectiveness in the establishment of a cloacal infection or "take." They found that an intrabursal injection can easily be made and that it is a practical method of vaccination for use on poultry farms. Their technic consists of injecting the virus into the bursal duct with a hypodermic syringe, having a blunt needle slightly curved near the tip, attached to it. In their opinion the optimum age for their method of vaccination is two to four and one-half months for Leghorn pullets and two to three-and-one-half months for Leghorn cockerels. They comment that the small body size of the younger chicks makes spreading of the cloacal lips and exposure of the opening into the bursa somewhat difficult, while in more mature chickens the bursa is very small or altogether absent.

For satisfactory results in intrabursal vaccination, a 0.2% dilution of dessicated virus is recommended; the same virus should produce infection when 0.1cc of a 0.02% dilution is injected intratracheally. These latter authors believe that in laryngotracheitis vaccination on poultry farms, the precautionary practice of examining the fowls on the fifth day for the purpose of detecting and revaccinating those which do not exhibit a "take" should be a regular part of the procedure.

Gibbs[4] has determined that in order to establish and insure a satisfactory degree of immunity for a flock, there must be 94% "takes" in chickens one to three months of age; 97% "takes" in pullets and cockerels four to seven months of age; and 90% "takes" in hens and roosters eight to twelve months of age. He classifies the "takes" according to the degree of intensity of the reaction as poor, fair, good and excellent.

A poor "take" is one in which the vaccination reaction is of the nature of a serous inflammation; the mucous membrane of the cloaca is merely moist from the exudation of mucous and serous fluid.

A fair "take" is one in which the vaccination reaction is of the nature of a fibrinous inflammation; the mucous membrane contains fibrinous exudate and petechial hemorrhages in the bursal groove.

An excellent "take" is one in which the vaccination reaction is of the nature of a severe diphtheritic or hemorrhagic inflammation; the cloacal mucosa shows not only a diphtheritic plug in the opening into the bursa of Fabricus, but also pseudo-membranes on the mucous lining of the bursal groove. Sometimes hyperemia and hemorrhage of the mucous membrane of the brusal groove and bursa of Fabricius are evident.

The number of "takes" is to be checked on the fifth day, and all that do not show a definite "take" should be revaccinated with a more potent virus, that is, one of a higher concentrated dilution until definite evidence of a cloacal or bursal infection is established.

All investigators agree that cloacal or bursal vaccination does not cause fowls to become carriers of the virus.

[1]Beaudette, F. R., and C. B. Hudson, 1933. Experiments on Immunization Against Laryngotracheitis in Fowls. *Jour. A. V. M. A.*, 82:2, pp. 360-476.

[2]Gibbs, C. S., 1933. The Immunology of Infectious Laryngotracheitis. Mass. Agric. Exp. Sta. Bul. No. 295.

[3]Beach, J. R., O. W. Schalm and R. E. Lubbehusen, 1934. Immunization Against Infectious Laryngotracheitis of Chickens by "Intrabursal" Injection of Virus. *Poultry Science*, 13:4, pp. 218-226.

[4]Gibbs, C. S., 1934. Infectious Laryngotracheitis Vaccination. Mass. Agric. Exp. Sta. Bul., No. 311.

Enterotomy in a Fox Terrier

By DON C. KELLEY,
K. S. C. 1935
Manhattan, Kansas

THE subject, a 10-month-old fox terrier, was presented to the veterinary clinic of the Kansas State College, September 11, 1934. There was a history of partial anorexia for food and water, emesis, and pain expressed by arching the back. The temperature, pulse, respiration and mucous membranes were normal. The feces were slightly tinted with blood.

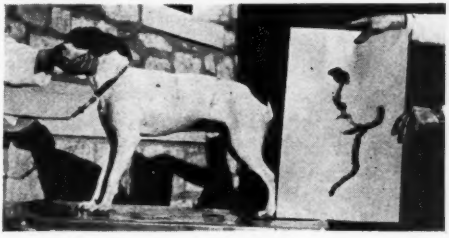
A provisional diagnosis of gastro-enteritis caused by some irritating substance in the digestive tract was made. A considerable amount of chicken feathers were recovered from the patient by gastric lavage. One-half ounce of mineral oil and a five-grain tablet of bismuth subnitrate were given, per os, as a protectant to the irritated intestine and the patient discharged.

SEPTEMBER 16th, this dog was returned to the hospital with aggravated symptoms; dull, listless, greatly emaciated, complete anorexia and vomiting more frequent and violent. The temperature, pulse and respiration were normal. However, the mucous membranes were congested. Either coprostasis or a foreign body in the intestine was suspected. A digital and fluoroscopic examination was of no avail.

Gastric lavage was again resorted to but little material recovered. One-half ounce of mineral oil and 15m of compound tincture of gentian were given per os. The owner was advised to bring the animal back in a few days if there was not a decided improvement.

Three days later the animal was again returned to the hospital in a very dull, emaciated condition. There was a purulent discharge from the nose, a very fetid odor on the breath, and the teeth were coated with a brown tartar. The temperature was 104.5° F. The pulse and respiration were accelerated. The animal walked rather stiffly with a high-arched back. By palpation of the abdomen one could feel an enlargement on the right.

THE condition existing was explained to the owner and a laparotomy was advised. Prompt consent was given. A site of operation, at the right of the penis, was shaved and prepared. Ether was used as the anesthetic. A sterilized cloth was laid over the operative area with an opening in the center through which to operate. A 2½-inch incision was made through the skin,



muscles and peritoneum and an obstructed portion of the intestine, which constituted the enlargement detected during the examination, was withdrawn from the abdominal cavity and retained well outside and away from the opening; this portion of the intestine being kept moist and warm by packing in sterile cotton saturated with warm water.

The obstructed portion of the intestine which was about eight inches in length, was congested. However, since the tissues were viable with not the slightest sign of gangrene, enterotomy instead of enterectomy was decided upon. A two-inch incision was made longitudinally on the greater curvature, at the distal end of the obstruction. The foreign object was grasped with forceps and removed. It consisted of a ball of cellophane, a piece of string and about eight inches of cloth. The lips of the wound were cleansed and the opening in the intestine sutured.

The suture material used was No. 00, ten-day, chromic catgut. A single suture, going down through the serosa and muscularis, to prevent a further tearing of the opening was first placed at each end of the incision. Then the Cornell and Lembert sutures were used to complete the closure. In the first row the needle enters the serosa and passes out through the muscularis, then enters the muscularis of the opposite side and emerges from the serosa. This is a continuous suture which goes on to form the second row of sutures. In this case the needle is passed in and out through the serosa and muscular coats, passed over the lips of the wound, and the same process repeated. When the sutures are tightened the serous surfaces are brought into apposition, with the first row of sutures buried.

The protruding portion of the intestine was thoroughly washed with warm, sterile, normal saline solution and returned to the abdominal cavity. The omentum was replaced as nearly as possible in normal position. The peritoneum, muscles and skin were then sutured with a single row of interrupted sutures. A pack impregnated with iodoform one part and boric acid ten parts, was placed over the wound and held in place with adhesive tape, a bandage around the body being inadvisable because of interference with urination.

AFTER being placed in a warm cage, the animal was given 60cc of sterile physiological saline solution subcutaneously. This was repeated the following day and 50cc of a 10% solution of glucose was given per rectum and 15 minims of compound tincture of gentian per os. This treatment was continued four days. The fifth day after the operation the stitches were removed and the animal took its first nourishment voluntarily. It was sent home two days later. Complete recovery followed. This was a good case for blood transfusion which would have been used, if at any time it had appeared that the saline solution and the glucose were insufficient to maintain the strength of the patient.

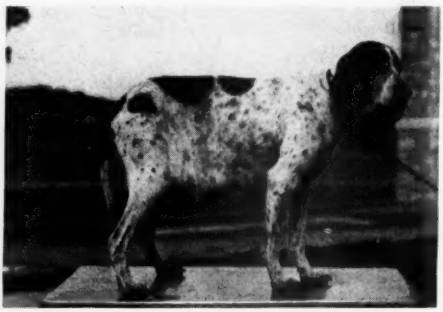
Large Abdominal Hernia in a Hound

A hernia consists of the protrusion of an organ out of its normal situation, through an opening in the surrounding tissue.

It seems that a tendency to develop hernia may be inherited.

Hernias are usually thought of as involving abdominal organs, but hernias of other parts, even of muscles may occur.

A case was observed in a hound dog. It was admitted to the veterinary hospital of the Kansas State College, September 29, 1934, and operated upon the same day. This was a ventral abdominal hernia. The hernial opening in the abdominal wall was

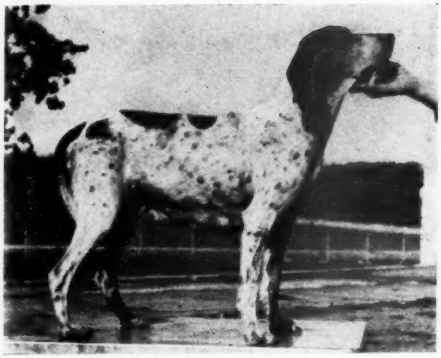


Abdominal hernia—before operation.

about ten inches long. Photographs one and two show the dog before and after the operation.

The area around the hernia was clipped and shaved; and tincture of iodine was applied to the skin. Ether was administered.

An incision, about ten inches long, was made through the skin. The protruding viscera were replaced in the abdominal cavity. Three rows of sutures were employed. The first row, through the peritoneum, was buried with a second row through the muscles. Both rows were continuous sutures, No. 2 cat-gut being employed. The skin was sutured with interrupted linen sutures and the incision covered with a 10% iodoform and boric acid powder. A many tail bandage was applied for support until healing occurred.



Abdominal hernia—after operation

The owner reported four months later that the dog had recovered completely and that he had caught fourteen raccoons since the operation.

Frank A. Story,
K. S. C. '35.

Manhattan, Kans.

* * * *

The Veterinarian & Pullorum Disease Testing

Since the application of the agglutination test for pullorum disease by Jones of the Rockefeller Institute, in 1913, there have been several modifications of his test, which was a serum, tube test. The tests which have been developed are of two types, serum and whole blood. There are two serum tests, tube and rapid plate; and three whole blood tests, rapid plate, tube, and the dried blood. All are based upon the same principle, the principle of agglutination or floctation of the cells of the antigen caused by the presence of specific anti-bodies in the blood.

These various tests have led to considerable controversy among poultry raisers, particularly hatcherymen, and veterinarians as to the test which should be considered official, and much argument as to who should conduct such tests. Control methods for the disease must be based upon definite standards to be effective.

The veterinarian's claim to official testing for this disease, is entirely justified, in that he is trained in the sciences of bacteriology, immunology, serology, pathology, etc., and is qualified to apply the test.

The technique of the test is relatively simple, but it is the underlying principles upon which the test is based, the application and understanding of these principles, with the proper interpretation of their results, that complicate it and necessitate special training in this field.

Some of the factors involved which require expert knowledge for proper application of the test are outlined below:

1. The antigen used, its concentration, age of the antigen, its origin as to the strain of organisms, technique of production, harvesting, preservation, conditions under which the antigen is kept, all are factors which must be understood by the operators.

2. The blood samples, the method employed in drawing, handling and preserving them are important, particularly in those tests in which the serum alone is employed. Hemolized, decomposed, improperly handled or contaminated blood samples may alter the reaction and lead to serious error.

3. Choice of test. The test employed by the operator is of utmost importance.

(a) The tube agglutination test has from the very first been considered as the official test, and rightfully, for as yet no other test has been shown to be consistently more accurate. This test, however, requires considerable time and equipment.

(b) The rapid plate test may in a short time be adopted as official for pullorum disease, as it is now official for federal Bang's disease control. It is far easier to apply, requires less time and equipment than the tube test and the percentage difference in results is probably less between these two tests than any others. The antigen concentration for this test is fifty times that of the tube antigen.

(c) The whole blood test was developed by those desiring a field test that could be applied and results obtained at one handling. This test, however, is unpopular with many technicians because of conditions in the field under which the test must be run. The temperature requirement, which should be 37° C. is hard to maintain in the field.

Further, at this temperature the drops of blood coagulate in a short time, fibrin strands appear and these mixed with the red blood corpuscles make interpretation of results difficult. The antigen for this test is recommended to be 75x tube No. 1 of McFarlands nephelometer compared with 50x in the rapid plate. This difference is due to the percentage of inert material (blood cells, fibrin) which do not enter into the reaction. The antigen must be stained and the type media used for its production is less productive than the ordinary type; for these reasons the antigen cost is greatly increased.

(d) The dry blood test was developed to simplify methods of sample collection and handling, but is considered far from satisfactory and not generally used.

4. The application of the test is of utmost importance, the dilution of serum and antigen must be accurate for determining diagnostic titres, temperature requirements must be maintained, the best results being obtained from temperatures of 37° C. The period of incubation, particularly those of the rapid plate tests is very important as some antigens react more slowly than others, older antigens, various strains, etc. In maintaining the necessary time it is necessary to provide measures to prevent evaporation and drying of the samples.

5. Reading the reaction or rather interpreting the reading is probably the most difficult part of the test. Differentiation between pseudo and true agglutinations, judgment on fine precipitants, titre determination, all require thorough knowledge, combined with practical experience.

The veterinarian is justified in claiming the right to do all official testing for pullorum disease control programs. The poultry industry will make greater progress in disease control by recognizing this, however much individual hatcherymen may desire to certify to the health of the birds they sell. The certification of the health of other farm animals by the owner or by the dealer in them has been abundantly tried and has as often failed. There is no reason to assume that poultry will prove an exception to this rule that all experience supports. Packers do not certify to the wholesomeness of their products, neither do dairymen. The public will not long accept at par a certification by those financially interested in the product certified. It, too, has had experience.

References:

1. Comparison of the efficiency of the simplified method of Bunyea, Hoel and Dorset and the standard test for the identification of causes of Pullorum Disease. W. L. Bleecher, *Jour. A. V. M. A.* 78:518-26, April, 1931.
2. Comparison of three methods of testing for Pullorum Disease with finer interpretations of readings on the old tube agglutination test. A. J. Durant, *Jour. A. V. M. A.* 81:37-45, July, 1932.
3. Field test for Pullorum Disease. D. R. Colburn & H. J. Stafseth, *Jour. A. V. M. A.* 79:241-3, August, 1931.
4. Modification of the rapid agglutination test for Pullorum Disease. H. Welch, *Jour. A. V. M. A.* 80:788-8, May, 1932.
5. Stained Antigen for the rapid whole blood test for Pullorum Disease. J. M. Schaffer, *Jour. A. V. M. A.* 79:236-240, August, 1931.
6. Diagnostic value of various tests for Pullorum Disease. W. A. Higgins & C. H. Schrader, Tab. Poultry Sci. 13:239-41, July 1934.

J. A. Knappenberger, K. S. C. '35.
Manhattan, Kans.

* * * *

Screw Worms Removed From Intestine of a Dog

Recently I encountered a nine-year-old coon dog that had been unthrifty and inactive for six months prior to my seeing him. His mucous membranes were pale and temperature subnormal. Tapeworm segmants were seen near the tail regions and he seemed a case of parasitic invasion. He was given a combination capsule on an empty stomach and within one hour expelled roughly a hundred of what seemed to be dipterous larvae, nine segmented and small at the head end, white in color and averaging a half inch in length.

The dog developed necrotic enteritis, died two days later, and was buried before a postmortem examination could be made. The parasites were sent to Washington for identification. The report was that they are the larvae of the Texas screw worm fly, which makes it an unusual case.

Belmont, N. Y. L. L. Howell.

Drugs Used in Veterinary Medicine

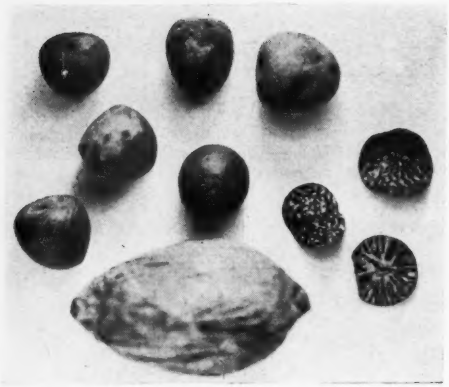
By VICTOR LEWITUS, Ph.G., B.S., M.A.,
Instructor in Materia Medica,
Columbia University College of Pharmacy.
Associate Professor of Materia Medica,
First Institute of Podiatry, New York

IV. BETEL NUT—The Source of Arecoline.

History.—Areca Nuts or Betel Nuts, as they are more commonly known, have been recognized from the earliest times. The Greeks and Romans appear not to have been acquainted with them, but ancient Arabian writers speak of the nuts frequently under the name of "foofel." They considered them to be astringent and tonic in action. Aside from its importance as a drug, the betel nut occupies a prominent place in the orient due to a traditional custom which has been passed on from one generation to another even to this day. A great part of the population of China and the East Indies uses a large portion of the nuts as a masticatory, and for this reason they are highly prized. For this purpose the seeds are divided into quarters or powdered, and a portion is rolled into the betel-pepper leaf (*Piper betel*) and then sprinkled with lime. Sometimes, the nuts are cut into thin slices or discs (as shown in the photo) especially in China, where it is similarly chewed. This mixture serves as a sialagogue and, due to a coloring principle which it contains, it gives the saliva a reddish tinge. After a period, the teeth assume a permanent dark color, but the natives do not look upon this as a disadvantage. They claim that it strengthens the gums, fastens the teeth, purifies the breath and cools the mouth. It has also been thought to have narcotic properties, but this is considered to be due to the betel leaf rather than the areca nut itself. In the West Indies, it is thought to strengthen the stomach and improve digestion when used in combination; but when used alone it is considered to be deleterious, impoverishing the blood and causing jaundice. The grated nut has long been employed as a vermifuge by the peoples of India, but its introduction into occidental medicine for such purposes did not occur until the middle of the nineteenth century.

Source.—The drug consists of the dried seeds of *Areca catechu,* a tall palm tree ranging from 40 to 60 feet in height. It was originally indigenous to the large group of islands off the Malayan peninsula, but is now cultivated chiefly in the Philippine Islands and the Indies. The fruit of this plant is yellowish-orange in color and is about the shape and size of a hen's egg but tapers slightly on either end, as shown in the illustration. It consists of a fibrous husk which covers the hard seed, a single one occurring in each fruit. The seed itself gets its common name, betel nut, from its use in combination with the betel leaf, though this is distinctly a misnomer. The better name would be areca nut. Another name, pinang nut, arises from the other name given the palm in its habitat, namely pinang tree. The seed is somewhat round, though cone-shaped and flat at the wider base, and variable in size, the larger seeds measuring about an inch in length and a half inch in width. It is very hard and heavy. Externally it is fawn-colored or light-brown though it is unevenly shaded with darker areas; and there are numerous fine vein-like structures running lengthwise over its surface. Internally, it is horny in texture and has a white tissue streaked with a reddish brown, presenting a marbled appearance. For this reason, when cut into sections (see illustration) it resembles slices of bologna. It has a slight cheese-like odor when fresh, and a slightly astringent, biting taste.

The fruits are collected when ripe, the quality of the seeds varying with the degree of ripening, and the fibrous husk is removed from the solitary seed. The seeds are boiled in water to which lime has been



Areca Nut.
Above, hulled; below, in the husk; right, sliced

added. They are then dried carefully, since imperfect drying may result in fungous growths within the tissues. Finally they are packed into bags for exportation from the markets of India and Ceylon. The larger nuts are given preference in commerce. They contain four alkaloids (arecoline, arecaidine, arecaine, guvacine) about 14% of a fixed oil, and 15% of red tannin with small amounts of gum and resin. For the purpose of extracting the four alkaloids, coarsely powdered betel nuts are treated with water acidulated with sulphuric acid. This extractive is concentrated and then precipitated with potassium-bismuth iodide. The resulting red precipitate is thoroughly washed and boiled with barium carbonate which causes solution of the alkaloids. After concentration, barium hydroxide is added in excess and the mixture is shaken out with ether promptly in order to separate out the arecoline. This leaves the other three alkaloids in the aqueous solution. The most important constituent of the drug is arecoline, the others for the most part being considered inactive. Of course the tannin acts when the powdered nut is employed.

Properties.—Arecoline is a liquid alkaloid, having the composition: $C_8H_{13}NO_2$, a methyl-ester of arecaidine. It is the active and also toxic principle and is present to the extent of approximately 0.1%. It is a strongly alkaline, volatile, oily liquid, colorless, and miscible with water, alcohol, chloroform and ether. There are two salts used in medicine chiefly the arecoline hydrobromide ($C_{18}H_{13}NO_2H\,Br$) and arecoline hydrochloride ($C_8H_{13}NO_2HCl$ which have similar properties. They are fine, white, bitter crystals, stable in air, optically inactive; soluble in water and hot alcohol; slightly so in chloroform and ether. The hydrobromide melts at 168 deg. C. and the hydrochloride at 158 deg. C. Recently synthesized product in the form of a salt, homarecoline hydrobromide ($C_9H_{15}NO_2H\,Br$), and known as arecaidinethylester hydrobromide has been made. It has similar physical properties, but is stated to have less toxic properties than arecoline. It melts at 118-119 deg. C.

Action.—The action of areca nut is due to the presence of the liquid alkaloid arecoline and the red tannic acid. The latter has an astringent effect on the mucous lining of the gastro-intestinal tract, producing an additional irritation to that described below, but this is compensated by a slower rate of absorption due to the astringent. Arecoline is not readily absorbed from the digestive tract and for this reason its salts, mainly the hydrobromide, are widely employed. This is readily diffusible through the mucous membrane, and for this reason poisoning may follow local application. When used on the eye, the tongue and the pharynx it usually causes great irritation, burning and often hyperemia. To avoid this reaction, and vomiting in small animals, the drug is administered in enteric-coated capsules or pills. The action of the drug is chiefly upon the autonomic and central nervous systems. It causes intense and persistent salivation, and the gastric and intestinal secretions are markedly augmented. Furthermore, peristalsis is greatly accelerated, often to such an extent that the animal suffers from severe cramps. It is this latter effect that has made its use unpopular with humans, and the drug is not official. It is interesting to note that these several effects occur regardless of the mode of administration, since isolated strips of intestine react similarly. The influence is exerted peripherally and the tonicity of the smooth muscle is increased. The end result is

prompt purgation usually accompanied by diarrhea, which has much to do with its anthelmintic efficiency. It affects the circulation by stimulating the vagus endings which in turn inhibits the activity of the heart. Although the blood vessels themselves are not affected, the blood pressure will be lowered due to the cardiac effects. The loss of water from the secretory glands increases the specific gravity of the blood plasma. In the respiratory tract it stimulates secretion of the bronchi and bronchioles as well as the muscles. In the cat and dog, intravenous injections produce marked constriction of the bronchioles, which, however, is only transitory. This often results in a dangerous dyspnea, the result of excessive secretion and constriction. Although considered to be a cerebral depressant, it causes stimulation of the reflex centers in the spinal cord, producing, especially in toxic amounts, convulsive symptoms. It is directly opposed to atropine in its action.

Therapeutics. — Arecoline hydrobromide is used chiefly in dogs as a teniacide, probably the most effective and satisfactory one known. According to Hall, Price & Wright, the dose for these animals according to size ranges from ½ grain for large to ⅛ grain for small dogs. Treatment is given on an empty stomach and the animal is not fed for several hours after dosing. There is no purge needed since the drug itself is cathartic. According to the above-mentioned workers, the drug is relatively safe in most cases, but some animals show signs of depression after treatment. Weak or sick animals should be given diminished doses. The freshly grated nut is sometimes used instead of the salt. The same treatment as outlined above is given to cats, the dose ranging from 1/25 to 1/16 of a grain, according to age. It is far more toxic for these animals than for the dog.

In the case of horses and cattle, it is employed as a laxative or as a drastic cathartic. It is administered subcutaneously in doses ranging from ⅛ to ½ grain to relieve laminitis, non-spasmodic colic, blind staggers and azoturia. Owing to its prompt secretory stimulation, it is frequently used in choke. If the colic is severe and there is cardiac weakness, a single dose of ¼ grain is recommended. If cardiac weakness is not marked, this dose may be repeated at 15-30 minute intervals until one grain has been given. Larger doses, although not necessarily fatal, are toxic, painful and seldom productive of the desired results if doses of the size given are not successful.

According to Schwartz, Imes and Wright, the freshly ground nut may be given to adult horses for removing tapeworms in doses of 1 to 1½ ounces in capsules, after the animal has fasted for 24 to 36 hours. In case evacuation of the bowels does not occur within four to five hours, it is advisable to give one or two pints of raw linseed oil. Arecoline is contraindicated in cases of weak, very young or senile animals, in nervous colic, in severe impactions and great distention, in obstruction or inflammation of the bowel, in cases of heaves or during pregnancy. It is sometimes used for its myopic effect in ½-1% solutions.

In cattle arecoline is used to relieve colic, to correct digestive debility in doses of ¼ to ½ grain. Since these animals are more sensitive to this drug than the horse, this dose should be repeated with caution.

For the treatment of Moniezia tapeworms of sheep, Hall recommends the freshly-ground nut be administered to lambs in doses of 1 to 3 drams. Martel recommends the nut for strongiloides of swine.

There are a few compound preparations on the market which, besides arecoline hydrobromide, contain strychnine and physostigmine. For complicated worm conditions it is also prescribed in combination with santonin, male fern, and a purgative particularly when round worms are present.

This drug has a well-deserved place in atonic conditions of the alimentary canal of animals. In addition, it is the most prized of the tapeworm remedies for dogs. It ought not lose its good reputation by being employed for very young, run-down or aged animals, since it is too active for such cases.

Toxicology.—As is true of most anthelmintic drugs, arecoline is a very active poison. Therefore, it must be expelled from

the digestive tract before toxic symptoms arise. Occasionally an animal shows a distinct sensitivity to it without apparent cause. In cats and dogs, large oral doses produce profuse salivation, vomiting and diarrhea. There is severe griping and intense pain. This is followed later by marked dyspnea, due partly to the excessive secretions in the bronchi and partly to the depression of the heart from direct and central influences. The spinal reflexes are exaggerated and tetanic convulsions occur, which soon pass into paralysis. If the heart stops, it does so in systole. When the drug is injected intravenously, the convulsive attacks come on more promptly and the central nervous system becomes paralyzed. The minimum lethal dose tables have not been accurately determined, but apparently chickens, pigeons, rabbits and guinea pigs are less susceptible to its effects than other common animals. The general run of symptoms consist of slow and feeble pulse, low blood pressure, excessive salivation, profuse sweating, slow and difficult respiration, cyanosis and collapse. The main reliance in treatment is the hypodermic administration of atropine, since this is the direct physiological antidote of arecoline.

Vulvitis in Feeder Heifers

During the early part of January, I was called to see some feeder heifers, reported to be acting queer, in fact very queer. The owner stated that he had about twenty heifers and fifteen steers on full feed. At times the heifers would run like they were mad or crazy, but that he had not seen any of the steers on a rampage. He added that he felt sure that nearly all of the heifers at times went wild, and that two heifer calves in the barn, that had never been in the feed lot, also had spells.

I was surprised on arriving at the farm to find everything quiet and the heifers feeding normally. As we stood talking one of these heifers took a spell, no spasms, just the running and bellowing as if in great pain. Soon the heifer returned to the feed trough and began to eat as if nothing had happened. I noticed that most of the heifers held their tails to one side of the normal position. We drove the heifer that had had the spell into the barn for examination.

The region of the tail and anus appeared normal, but the vulva was swollen and the skin around the lips was covered with scabs. After I had removed the scabs the underlying surface resembled a piece of raw steak. One spot appeared like an ulcer. The membranes of the vagina showed slight redness.

I then inspected the milk cows. They were receiving the same feed as the heifers except the grain ration was curtailed considerably for them. The heifers were receiving a full feed of ground shelled corn and alfalfa hay. I changed the grain feed to oats. The reason for this change was that the corn in this territory was very moldy following the invasion of ear worms. Perhaps the mold passed with feces was causing the trouble, in some way. Smears were taken but nothing definite was learned from them.

With rubber gloves and sponges soaked in a strong solution of creolyptus and water the areas were cleansed of scabs. Much manual manipulation being necessary to remove some of the scabs, the resulting raw surfaces bled easily.

With a swab of cotton on a stick of wood of the proper shape, the vagina was cleansed, as well as the lips of the vulva, and sores with the same solution, then dried. With another swab the vaginal mucous membranes, and the ulcers were painted with a quick-drying liquid, pyoktanin blue. This treatment was repeated four times with one day between each two treatments. On the last visit the owner requested that I vaccinate these heifers with mixed infection bacterin, which was done, but I do not believe this helped in cleaning up the condition.

Three weeks after the last treatment only three of the worst showed any scar tissue. The cause may have been the corn, but sows and gilts that were following these cattle at the time did not develop any symptoms. The hogs were kept out of the yard after my first visit.

Humboldt, Ia. G. T. Windrath.

Abstracts

Temperature at Parturition

In the cows under investigation[53] the rectal temperature was observed to rise distinctly about four weeks before parturition. About 56 to 9 hours before parturition, the rectal temperature began to fall again. The average difference for the morning temperature was 0.5°C, for the noon temperature 0.5°C, and for the evening temperature 0.7°C. Immediately after calving, the rectal temperature rose again, reaching a normal value within 5 to 24 hours.

Undiagnosed Respiratory Disease of Cattle

A specific infectious disease of the respiratory tract of cattle has been observed;[51] its etiology is still obscure. The disease is characterized clinically by a catarrh of the upper respiratory tract and of the conjunctivae. Often it is complicated with an acute bronchitis, rarely with a bronchopneumonia. The contagiousness of the disease is high. In four herds with a total number of 362 cattle, 85 per cent fell victims to the disease. On the basis of localization of the lesions and severity of the outbreak, the disease may be grouped into three forms. The mild form consists merely of an affection of the upper respiratory tract; it was observed in 63 per cent; recovery took place in 8 to 14 days. The semi-severe form is characterized by clinical symptoms of bronchitis; it has been observed in 28 per cent; recovery takes place in 2 to 3 weeks, though coughing will persist up to 2 to 3 months. The severe form is characterized by a bronchopneumonia; it has been observed in 8 per cent; this form may terminate in death. Bacteriological examination of the lungs revealed the presence of bacteria of the hemorrhagic septicemia group, of staphylococcus albus, streptococci, and other accessory bacteria. The bacteria, however, are not considered to be of an etiological moment, but, probably, they exert a detrimental influence.

[53] Pribyl, E. 1933. The fall of rectal temperature a premonitory sign of parturition (transl. title). *Zv. rozp. Z. O.* 7(22): 263-264; (23):270-276; (24):277-283. *Abstr. Rev. Veter. Slave* 1(5):195.

[51] Novacek, A. 1933. Epidemiological observations upon infectious bronchitis and bronchopneumonia in cattle (transl. title). Abstr. in: *Rev. Vet. Slave* 1(4):126.

The Portal of Entrance of Bang's Bacillus in Cows

In combatting an infectious disease it is important to know through what portal the specific organism enters the body. Experiments on this subject were made during recent years at the National Institute of Serotherapy of Rotterdam. It has been generally believed that there were two principal portals of infection: the digestive route and the vaginal route. In the latter it was thought that the infection took place through the intermediary of the bull.

The following is a résumé of the author[52] experiments in a study of this question:

1. *Infection by the digestive route.*—January 29, February 16, and March 10 a cow received a mash prepared with water in which an infected afterbirth of an aborting cow had been washed. Microscopic examinations and cultures of the afterbirth had confirmed the diagnosis of Bang's disease. Eight days after the third feeding the agglutination of the animal's blood was positive. The agglutination titre was 1:100 on April 1 and 1:200 on April 8. Although the intake of bacilli was high, the agglutination reaction became negative by April 29. The author, therefore, agrees with others that sustained infection by the mouth occurs only in pregnant animals. This experimental cow was non-pregnant.

2. *Infection via the skin.*—A bandage impregnated with Bang's bacillus was bound to a hind hoof. It was applied March 17 and renewed March 19, 22, and 26, then left in place. Sixteen days after the last application, the serum reacted at 1:200 and remained thus until May 29. This experiment confirmed the same test made in Denmark.

3. *Infection via the teat.*—The object of this experiment was to determine whether infection takes place through the intermedi-

[52] Buchli, K. Les vois d'infection dans l'avortement épizootique à bacille de Bang de la vache (The Route of Infection in Bang's Disease) Abstract from *Tidjschrift voor Diergeneeskunde*, 60:7, in *Ann. de Méd. Vét.*, 79, November, 1934, pp. 472-474 by L. De Saint Moulin.

ary of the soiled hands of milkers, either through the skin of the teat or the teat canal. The latter is the least probable at least in regard to spreading from the outside to the inside after milking.

Every morning a milker, before milking, wet his hands (as milkers usually do) with the contents of a bottle containing fresh bouillon cultures of Bang's bacillus. Beginning May 18 a cow, perfectly healthy, was milked twice a day under that condition. After thirteen weeks, positive agglutination of Bang's bacillus was obtained with the serum of this animal.

4. *Infection via the conjunctiva.*—A cow received three drops of a bouillon-glycerine culture of Bang's bacillus in the eye. There was no agglutination on up to February 16 when the instillation was repeated. Three weeks later there was a feeble reaction and on March 10, a reaction at 1:200. Conjunctival infection, therefore, occurs.

5. *Infection via the vagina.*—The test consisted of soiling the preputial cavity of a bull with a culture of Bang's bacillus. The cow was served twice in 48 hours by the bull, July 27 and 28. The strongest reaction resulting was obtained on October 8. It did not exceed 1:20 which was, of course, insufficient.

This observation confirms the numerous experiments made in the United States by which it was shown that infection by way of the vaginal route does not cause the appearance of antibodies in the blood of cows thus infected although in most of them typical epizootic abortion ensues.

In addition to the two principal routes (digestive and vaginal) there are numerous portals of entrance for Bang's bacillus.

Chloral Hydrate Narcosis in Dogs

The practicability and harmlessness of chloral hydrate narcosis for dogs, previously pointed out by Rajcan, are confirmed by Kucera.[54] The dose recommended is 0.2-0.25gm per Kgm. bodyweight. If the narcosis produced is insufficient, the dosage may be increased to 0.27-0.3gm per Kgm. body-weight. In computing the dose, the type and the constitution of the animal should be taken into consideration.

Hepatitis of Young Pigs

A grave hepatitis of young pigs, possessing indefinite clinical symptoms, little distinguishable from those of runty pigs is described by Nusshag.[55] Characteristic lesions are found in the kidneys, intestines, and in the liver; the lesions in the latter being indistinguishable from those of acute yellow atrophy. Hog cholera and toxemias induced by feeding fishmeal and cod liver oil play an etiological rôle in some cases; in others, no causative agent could be found. The occurrence of the lesions presupposes an individual disposition. The term "toxic liver disintegration" is proposed by the author for this condition. Prevention may be achieved by proper feeding and the experimental addition of vitamin-D-containing foods during the winter months and, finally, by preventive measures against hog cholera.

The estimated number of mules and mule colts on farms January 1, 1935, was 4,795,000, a decrease of 130,000 head, or about 3% from a year earlier. There was some increase in the number of mule colts raised in 1934 over 1933, but this increase was much less marked than in the case of horse colts. The value per head of mules and mule colts on January 1, 1935, was $98.21, compared with $81.54 a year earlier. This was the highest value per head since January 1, 1921. The total value of all mules on January 1, 1935, was $470,900,000, compared with $401,596,000 a year ago.

While the decrease in the number of horses and mules on farms since January 1, 1920, has been less than 9,000,000, there has been a decrease of more than 1,000,000 horses and mules used in non-agricultural work. The total decrease in horses and mules from the peak in 1920 has therefore been more than 10,000,000 head. Inasmuch as it requires an average of four acres per head to produce and maintain horses and mules, the decrease of more than 10,000,000 means that over 40,000,000 acres, which formerly produced or maintained animal power, is now producing surplus food products or surplus raw materials for clothing.

[54] Kucera, C. 1933. Chloral hydrate narcosis in domestic animals (transl. title). *Klin. Spisy v. s. z.* 10(96): 157-174. Abstr. *Rev. Veter. Slave* 1(5):181.

[55] Nusshag, W. 1930. Über das Wesen der sogenannten enzootischen Leberentzündung der Ferkel. *Archiv. Tierheilkunde* 61(1):1-37.

Surgical Treatment of Chronic Otitis Externa in the Dog

By H. J. JEWELL,
K. S. C. 1935
Manhattan, Kansas

OTITIS externa is a condition frequently met with in dogs, particularly in the long-eared breeds such as setters, pointers, and hounds. The pendulous ears cause a lack of proper ventilation and evaporation in the ear canals, so that the natural secretions accumulate in excess. When the condition is neglected, ulceration, erosion, and exuberant granulations may occur.

The long and slightly tortuous course of the tubular portion of the annular and conchal cartilages is an important predisposing factor in the development of this disease. This peculiarity also renders drainage difficult and when excessive amounts of septic material remain in the auditory canal, erosion or ulceration develops. Erosion is commonly seen in neglected cases in the vicinitiy of the tympanic membrane. Usually it appears at the highest level of the retained fluid. If the erosion extends to the cartilage, irreparable damage may occur.

August 21, 1934, a ten-year-old pointer entered the Kansas State College veterinary clinic. The dog had been treated for otitis externa with all the usual medicinal agents for two years without benefit. Prof. E. R. Frank decided to perform the operation described by C. Formston and J. McCurm, in the *Veterinary Journal* (London). The technique is as follows:

The animal is restrained, preferably in lateral recumbency, with the affected ear uppermost. The operative area is shaved and disinfected. The line of incision is then anesthetized with a two per cent, sterile, procaine solution. The auditory canal should be packed with cotton to prevent injuring the inner portions of the ear during the operation. A skin incision is made, beginning at the external opening of the auditory canal and continuing downward, one-half to one inch, depending upon the size of the patient. The skin is then dissected back (Fig. 1.) from the underlying tissues so as to expose the annular cartilage. From the cartilage, a triangular section is removed together with the adjoining skin on the inner surface of the canal. The flaps of skin are sutured to the remaining tissues on the inner side of the ear canal (Fig. 2).

The triangular section of cartilage removed usually includes the major portion of the diseased tissue. Any papillomatous or granulated tissue remaining may be removed quite readily. There still remains approximately three-quarters of an inch of the external auditory canal, so that the tympanic membrane is not directly exposed. Healing takes place readily, due to the evaporation of the ear secretions.

The ear is laid back on the head in the direction of the opposite ear, and a gauze

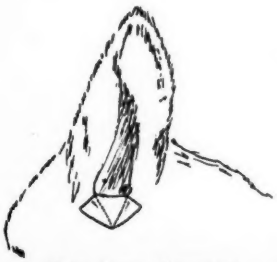


Fig. 1. Skin flaps dissected back exposing cartilage.

Fig. 2. Dotted line represents the edges of the skin wound after suturing.

Fig. 3. Dr. Frick's modification—skin flaps sutured.

pack impregnated with boric acid is applied. A bandage is applied over this to retain the pack in position. After 48 hours, the bandage is removed, and the ear is exposed to ultra-violet light. Another pack is then applied to the ear for protection.

Although healing by primary union does not take place, there is no marked suppuration from the wound. The patient seems to experience relief very soon after the operation. Healing occurs in seven to 14 days.

PROF. E. J. Frick modified this technique for application on smaller dogs, such as the Pekingese. The modification consists in removing a triangular section of cartilage *and skin;* the base of the triangle uppermost. The outside skin flaps are removed rather than united to the remaining tissue on the inside of the ear canal to allow better drainage and more tissue in contact with the air. The edges of the skin wounds are sutured to their fellows of the opposite side of the cartilage. Gratifying results have been obtained on three cases on which the modified operation was performed. This operation has seemingly solved the old troublesome problem of treating chronic ear cankers.

* * * *

The value of the horses and mules on American farms is greater than that of all cattle and calves, and three times as great as the value of all hogs and sheep combined, on January 1, 1935, according to the figures released February 15, 1935, by the Bureau of Agricultural Economics, United States Department of Agriculture.

* * * *

The estimated number of horses and horse colts on farms January 1, 1935, was 11,827,000 heads. There was a decrease of 136,000 head, or about 1% from a year earlier. This is the smallest decrease in one year since numbers began their decline about twenty years ago. There was a marked increase in the number of colts raised in 1934 over those raised in the preceding year. The estimated number of horse colts foaled in 1934, still in existence on January 1, 1935, was 692,000 head, 27% larger than a year earlier, and the largest number since 1922. The value per head of all horses and colts on January 1, 1935, was $76.18, compared with $66.30 a year earlier. The total value this year was $901,038,000, compared with $793,155,000 a year earlier.

Unaccountable Popular Misconceptions

That darkness of the tongue and palate in dogs is directly proportional to their value.

That bitches do not have rabies.

That garlic buried hypodermically, or a piece of copper wire or rope looped through the dewlap prevents blackleg in calves.

That whenever a dog gets sick, he should be wormed.

That some patent medicines cure abortion in cattle.

That hippopotami sweat blood.

That sex of the weaker parent and the offspring are the same.

That lack of water will make a dog rabid.

That a cold should be "stuffed" and a fever starved.

That alcohol is of value in snake bites.

That insertion of a foreign object into the uterus is a good substitute for spaying in dogs.

That raw meat fed to puppies causes distemper.

That milk in a dog's diet "breeds worms."

That rubbing snow or ice upon frost bitten tissue is of benefit.

That death from drowning is caused chiefly by water entering the lungs.

That mare's milk will cure whooping cough.

That handling toads causes warts.

That tomatoes will kill a hog.

That porcupine "shoot" their quills and snakes "shoot" their venom.

That thunder turns milk sour.

That horse hairs soaked in water for a few days turn to hair-snakes.

That milk snakes cry like a calf and after attracting a cow, will climb her legs and suck her.

That a moonblind horse is "more blind" during a change of the moon.

That Haarlem oil in the eye will cure moonblindness.

That gunpowder fed to fighting dogs makes them more pugnacious.

Wesley O. Keefer.

Columbus, Ohio.

ARMY VETERINARY SERVICE

Major Joseph H. Dornblaser is relieved from further assignment and duty at Ft. Bliss, Texas, and will proceed to Fort Reno, Okla., and report to the commanding officer Quartermaster Remount Depot for duty.

Captain Charles S. Greer is assigned to station at Lexington, Ky., effective upon completion of his present tour of foreign service and will join that station and report to the officer in charge, remount purchasing and breeding headquarters, for duty.

Major Oness H. Dixon, Jr., is assigned to duty at the Quartermaster Depot, Chicago, Ill., effective upon completion of his present tour of foreign service in the Hawaiian Department.

2d Lieut. Robert A. Boyce, Jr., is relieved from duty at Front Royal Quartermaster Depot, Front Royal, Va., effective at such time as will enable him to proceed to New York, N. Y., and sail on or about May 14, 1935, via Government transportation, for the Philippine Department, for duty.

Colonel James R. Shand is relieved from further assignment and duty at Fort Lewis, Wash., effective on or about March 20, 1935, and will then proceed to Fort Francis E. Warren, Wyo., and report to the commanding officer for duty.

Veterinary Reserve Corps

Separations—Lashbrook, Worden Graham, Capt. Died January 18, 1935—Indiana.

Martindale, Earl Columbus, 1st Lt. Died January 18, 1935—Michigan.

Army Veterinary Corps Examination

The War Department is contemplating an examination to fill existing vacancies in the Army Veterinary Corps some time in June or July, 1935. There are at present five vacancies. Definite information will be published at a later date.

Colonel Gerald E. Griffin

Colonel Gerald E. Griffin, U. S. Army, retired, died at Walter Reed General Hospital, Washington, D. C., February 2, 1935.

Colonel Griffin was born in Birmingham, England, March 18, 1860. He came to the United States in the early eighties and spent a little over a year on a cattle ranch in the West, when he came to Washington, D. C., and enlisted as a private, Company C, Signal Corps, U. S. Army, June 29, 1883. While stationed in Washington he studied medicine for a year or more and was then transferred to Fort Robinson, Nebr., where he was honorably discharged June 28, 1888, as First Class Private. He enrolled as a student in the American Veterinary College, was graduated March 4, 1889, and began practice in Dubuque, Iowa.

September 17, 1889, he was appointed Veterinary Surgeon, 5th U. S. Cavalry, with the rank of regimental sergeant major, by warrant issued by the Secretary of War, to succeed Benjamin D. Pierce, M.R.C.V.S., from Massachusetts, who resigned in July, 1889. The 5th Cavalry was stationed at Fort Reno, Indian Territory at that time, and Dr. Griffin served with this regiment in Indian Territory and Texas until 1899. In 1899 Congress authorized two veterinarians, one first class and one second class, for each Cavalry regiment. Dr. Griffin was appointed veterinarian, 1st class, 5th U. S. Cavalry, with pay and allowances of a 2nd lieutenant mounted. He was appointed Chief Veterinarian, Puerto Rico Expeditionary Forces, November, 1899, and served at San Juan and Mayaguez, P. R. While in Puerto Rico he conducted an important horse-feeding experiment with grass

Size of top: 20½x44½ inches, with extension bar to increase length. Adjustable to any height for operating.

Send for copy of our 1935 Catalog.

H & D CANINE OPERATING TABLE

High-Grade—Low-Priced

The most practical canine operating table ever made at the lowest price ever quoted. Sturdy, durable, efficient. May be tilted from horizontal to nearly vertical in an instant. Rigid in all positions.

Beautiful polished Monel Metal non-stainable top..$47.50
Steel white enameled top..... 40.50

5% Discount for Cash

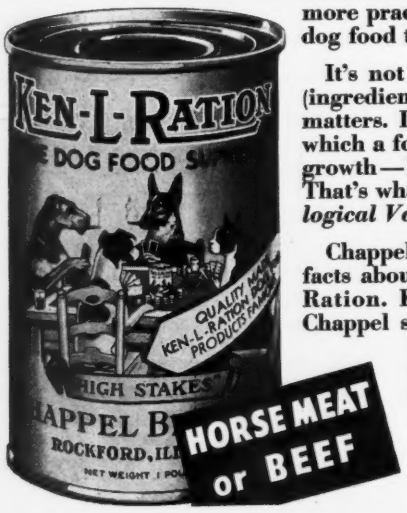
HAUSSMANN & DUNN MFG. CO.,
4223-4243 W. Lake St., Chicago, Ill.

CHAPPEL'S STANDARD OF BIOLOGIC VALUE

The food must permit growth and successful reproduction and lactation through three generations of animals; plus continued reproduction and lactation within each generation.

■ **Chappel Bros. were the first to make canned dog food, and they are the *first* to set a high *Biological Value* for canned dog food.**

Here is a standard — not of mere words of chemical analysis — but of PROVED RESULTS. Ken-L-Ration, fed exclusively to standard-bred test animals, has grown three generations of animals, produced full litters and furnished all the milk used by the offspring—and, this is important—within each generation there was continued reproduction and lactation. There is no better and more practical test of the real value of a dog food than this.



It's not so much what a dog food *is* (ingredients or chemical analysis) that matters. It's what it DOES. The effect which a food has on the dog's LIFE—his growth—his health—tells its *real value.* That's what we mean by "B. V." or *Biological Value.*

Chappel Bros. now offer you the plain facts about Biological Value and Ken-L-Ration. Ken-L-Ration is made to the Chappel standard of a definite, proved Biological Value, and we invite any and all comparisons on this clearly stated basis of quality.

CHAPPEL BROS. INC.
Rockford, Illinois

A FOOD SUPPLEMENT

CARATONE

Rich in Vitamin A activity

Protects & Promotes Your Dog's Health

Caratone, the new food supplement, is a carotene concentrate. Carotene is the recognized standard source of vitamin A activity. Caratone offers you a low cost method of combating vitamin A deficiency—thus building resistance to many of the most difficult dog diseases such as distemper—ophthalmia—various infections, etc.

A Vital Necessity

Vitamin A, called the anti-ophthalmic—anti-infective vitamin is absolutely necessary. It is supplied naturally as the yellow pigment in certain plant material. Modern living conditions, however, prevent the average dog from getting a sufficient amount from natural sources. Now, however, a little Caratone every day will supply his needs—tone him up—guard against infection and generally promote and protect health.

Get the Caratone Story:—Write today for folder telling how to guard your dog's health at very low cost

EFF LABORATORIES, INC.
Dep't 21 Cleveland, Ohio

CARATONE DOG HEALTH INSURANCE

and molasses. Returning to the United States in 1901 he was assigned to Fort Sheridan, Ill., transferring to the Artillery Corps as veterinarian on June 21, 1901, in which capacity he continued until the organization of the Veterinary Corps in June, 1916.

During this period he served as Chief Veterinarian, Army of Cuban Pacification, 1906-1908. He succeeded the late Dr. Sidney L. Hunter, veterinarian, 6th Cavalry, as Instructor in Hippology, School of the Line, Fort Leavenworth, Kan., in June, 1909, and served there until October, 1913.

When the Veterinary Corps was organized as a result of the passage of the National Defence Act, June 3, 1916, Colonel, then Doctor

FILSOL

Hays

FOR CANINE FILARIASIS

Announcing

30cc rubber stoppered vial, each $1.50

Sold through the veterinary profession only

Manufactured by

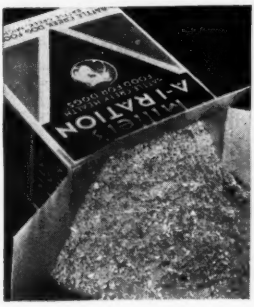
Southern Ampoule Company

268 Spring Street · ATLANTA, GEORGIA

Now 50% *More Meat*

AS WELL AS FLEISCHMANN'S IRRADIATED DRY YEAST IN

MILLER'S RATION



A highly nutritious, palatable, easily digested food for all ages and all breeds.

Now you can beat higher meat costs with the new Miller's Ration. We've stepped up its meat content 50%—plenty of meat, but not too much, for the average dog. Bone and blood meal, choice golden cereals, minerals, and Fleischmann's Irradiated Dry Yeast (Vitamins B, D, G,) complete this tasty food so fine for hospital diet schedules.

Try the Miller System of Feeding, Doctor, for excellent results and a timely way to keep costs within reason.

Make the MILLER 2 WEEK TEST

Special D. V. M. Offer

We'll be glad to send professional samples and complete information about the Miller System at no expense or obligation. We do not make or sell dog remedies.

Good Only East of Rockies

BATTLE CREEK DOG FOOD CO.
433 State St., Battle Creek, Mich.

NRA

Gentlemen:

As offered in Veterinary Medicine kindly send the professional samples of Miller's Ration and information about the Miller System.

Doctor.....

Address.....

City and State.....

A DOCTOR KNOWS

A veterinarian knows how to treat ailments, and how to cure them. He also knows what causes them, and how to prevent them.

Dog lovers look to veterinarians for sound advice on feeding problems. A quality dog food such as Ideal Dog Food is conducive to a dog's good health.

You can safely recommend

Ideal DOG FOOD

An Ideal Meal for any Dog

✦

EMPIRE BEEF & PROV. CO.

Dog Food Division of

WILSON & CO.

General Offices:

4100 S. Ashland, Chicago, Ill.

"Dejem"

CANINE DISTEMPER COMPOUND

"Dejem" is decidedly beneficial to dogs with DISTEMPER and also controls the severe sickness following inoculations.

"Dejem" 16 oz. size, 1 bot. .....$ 2.75
3 bot. .....$6.75, 6 bot. $12.00

Mangan & Co., Laboratories
294-298 E. 161st St. New York

Griffin, and the late Dr. Olaf Schwartzkopf were selected as the first veterinary examining board to examine all veterinarians, then on duty in the Army, for commission, and to initiate the first organization plans for the present Army Veterinary Corps. He was commissioned a major due to his length of service and was appointed the first Chief of the Veterinary Division, Surgeon General's Office, when this country entered the World War, and continued in this capacity until November, 1917. He was appointed Veterinary General Inspector for the eastern zone in which capacity he served to co-ordinate the field activities until he was called upon to organize the Veterinary Training Center at Camp Lee, Va., in April, 1918. His last assignment and

FISTONE

★

Use it, as many practitioners have learned to do, in catarrhal endometritis. It is near specific. Fistone is equally efficacious in localized suppurative infections encountered in equine practice, such as Fistula of the Withers, and of poll, and in quittor.

Fistone is administered with the feed, is inexpensive and within the reach of all veterinarians.

The Fistone and Appliance Company,
College Corner, Ohio

Trial Order—one dozen boxes (once only).....$ 8.00
Regular price—one dozen boxes..... 10.00
One-half dozen boxes..... 5.00

You Told Us
Starches Were Hard For Dogs To Digest

So We Found A Way To Overcome This

Due to the deficiency of *ptyalin* in a dog's saliva, it has been hard for most dogs to digest starches. This was a severe indictment against foods like Gaines that contained cereals and vegetables.

However, a material has been found that, to all intents and purposes, takes the place of this *ptyalin*. In the presence of water it liquifies the starch cell, splitting it and putting it in such shape that the dog's digestive system can efficiently carry on.

Obviously, this makes Gaines Food go further as more cereals and vegetables are put to useful work. It reduces feeding costs but, more important, is the result that the starches, being digested, are passed on—not backing up to cause a myriad of skin troubles.

These Starch-Splitting Enzymes are only one improvement we've made in Gaines Food from listening to veterinarians. In fact, our whole formula represents a consensus of your opinions. It is, therefore, a Food you can recommend. Test it out—see if it doesn't change your ideas about commercial foods.

Test this improved Dog Food. We're sure you'll find it worthy of your recommendation. Just sign below—or mention VETERINARY MEDICINE and professional sample will be sent you without obligation. Also full details of our dealer proposition if we have no representation in your territory.

GAINES FOOD CO.

Box H **Sherburne, N. Y.**

GAINES MEAT AND MILK MEAL COOKED

GAINES KRUNCHON MEAT & MILK MEAL IN PRESSED FORM

MASON'S *Kennel Fences*

Best for Dog Hospitals and Boarding Kennels

$69.55 and up

Mason's are Real Kennel Fences—Strong, Good Looking and sold under a Money Back Guarantee to hold the largest and strongest dogs. Used and approved by best Kennels everywhere.

SEND FOR FREE CATALOG

Describing Permanent and Movable Dog Fences, Kennel Stalls, and Gates at Low Direct Factory Prices.

MASON KENNEL FENCE CO., Box 77, Leesburg, Ohio

Announcing

The publication of a factual booklet based on a scientific feeding study covering 15 generations by a well-known canine authority. It provides a definite basis for your dog food recommendations, and gives the latest laboratory findings and comparisons of various feeding regimes. This informative, FREE booklet, entitled "TESTS and TESTIMONIALS," may be obtained by writing to—

JEM ANIMAL FOOD CORP.
470 Morgan Ave., Brooklyn, New York

Your request for the booklet will also bring you a generous sample of

BALORATION

TONAMINE

. . . an Effective Reconstructive

Tonamine builds up the strength of convalescent animals and undernourished puppies. Restores the appetite of run-down small animals. Successfully offers Vitamins B, G and D as a supplement to regular diet. Also is rich in food value and good for distemper. Keeps small animals "fit." Tonamine is the ideal reconstructive.

FREE Booklet

Write today for new booklet "Can You Keep Your Small Animals Out of the Rough?"

R. J. STRASENBURGH CO.
Rochester, N. Y.
Pharmaceutical Chemists Since 1886

CROCKETT HOTEL

Comfortable rooms with sleep inspiring beds, private bath, ceiling fans, and circulating hot water. Splendid food in the Crockett Coffee Shop—moderately priced.

LARGE SPACIOUS ROOMS WITH BATH

FROM $1.50 A DAY

SAN ANTONIO
TEXAS

station was at Governors Island, N. Y., where he was retired from active service on July 7, 1922, on account of physical disability incident thereto.

Colonel Griffin was an outstanding leader in the military veterinary profession. He found time to take two post graduate courses during his career, and without doubt by his high personal ideals and professional qualifications, was one of the early pioneers who had a great deal to do with establishing the present Army Veterinary Corps.

Interment, with simple services at the grave in Arlington National Cemetery, was held on Tuesday, February 5th.

He is survived by his widow and daughter, who reside in Washington, D. C.

IMPROVED ANTHRAX VACCINE

An important patent was issued on January 22, 1935, by the U. S. Patent Office to Dr. Mario Mazzucchi, Director of the Veterinary Department of the Milanese Serum Institute, Italy, for a new anthrax vaccine which is expected to bring anthrax under much better control than heretofore.

The new vaccine contains a chemical which, immediately upon injection, walls in the anthrax germs, thus holding the anthrax spores of the vaccine in check, and allowing these organisms to pass into the system only very slowly. Under these conditions the vaccine permits the injection of anthrax spores of increased virulence with safety, producing an absolute and lasting immunity. It is believed that this vaccine is as nearly 100% effective as can be expected of any biological product.

In Italy, where the new vaccine was developed, it has been used for the past three years on almost two million animals with no failures. In Austria, Professor Gerlach employed this product in one of the severest anthrax outbreaks ever experienced there, with such satisfactory results that the Austrian Government conferred upon Mazzucchi, the inventor, the highest decoration which can be given for such achievement.

In the United States, the Mazzucchi vaccine was tested experimentally on a considerable scale in 1933 by the Lederle Laboratories and in 1934, approximately 200,000 animals, includ-

Classified Advertisements

For Sale, Wanted, etc., $2.00 for 25 words or less; additional words, 5 cents. 25 cents extra when replies are sent in care of VETERINARY MEDICINE.

DOG WORLD covers all breeds, all dog subjects monthly; $2.00 per year, $3.00 for 2 years; $5.00 for five years. Can furnish cash or C. O. D. any dog book published. Judy Publishing Company, 3323 Michigan Blvd., Chicago, Illinois.

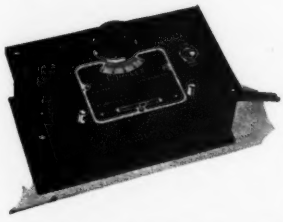
WANTED: Copies of the February, March, April May and June 1934 issues of VETERINARY MEDICINE. Your subscription will be advanced one month for each magazine returned. Address: VETERINARY MEDICINE CORP., 75 E. Wacker Drive, Chicago, Ill.

FOR SALE: Oster clipper with plucking, shaving and clipping heads, oil, grease, brush, etc., packed in leather-covered carrying case. Absolutely brand new; $49.90. Made to sell for $63.00. Address No. 122, care of VETERINARY MEDICINE.

FOR SALE: Veterinary hospital, drugs, equipment and modern residence in good dairy territory in South Western Wisconsin. Established 26 years. For sale by widow. Address No. 124, care of VETERINARY MEDICINE.

The Bunsen burner was devised in 1855 by Robert Wilhelm Von Bunsen (1811-99), German chemist, who was for many years professor of chemistry at Heidelberg.

COMPREX
Special Electro-Cautery



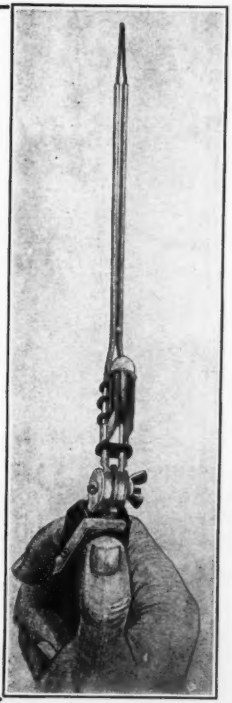
Indicated for ALL cauterization procedures on large and small animals and most operations where it is desirable to minimize hemorrhage. Combination trigger and button control. The COMPREX CAUTERY accommodates the new "CAUTERY-LITE" (illustrated) which gives splendid illumination at the cautery tip—no wires or complicated connections—it simply snaps on the COMPREX CAUTERY handle.

COMPREX SPECIAL ELECTRO-CAUTERY TRANSFORMER with ***"lifetime guarantee,"*** complete with combination trigger and button control and three tips—for 110 volt 50-60 cycle A.C. $29.50
for 110 volt 25 cycle A.C. 32.50

COMPREX CAUTERYLITE with bulls eye lamp $1.50

Order through your dealer or send to us for literature

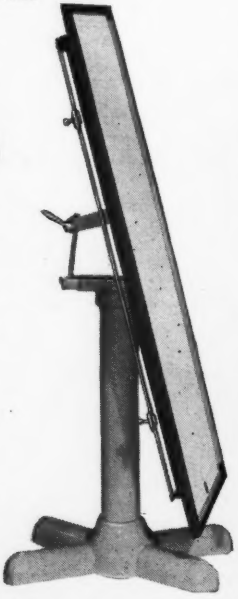
Comprex Oscillator Corporation
456 Whitlock Ave. :: NEW YORK, N. Y.



The Haglo Operating Table

A carefully engineered small animal table that meets the demand in price, appearance, and usefulness.

The height from the floor is 35 inches; the dimensions of the top, are 22 x 60 inches. Fits any small animal of any size or species.



Constructed on an enamel base that attaches to the floor with lag screws. The top is acid-proof, baked, white enamel with black, raised borders and end drain.

The adjustment mechanism, operated with a lever, tips the table from horizontal to vertical and all intervening angles.

Nickel chrome-plated side bars armed with sliding stays that anchor at any point to suit small animals of any size and secure them in any surgical position.

The Haglo table is a credit to any surgeon and to the finest hospital.

H G 2820—Haglo Operating Table, complete $65.00
(Less 2% discount for cash)

Haver-Glover Laboratories · Kansas City, Mo. · PRODUCTS

The Haver-Glover Laboratories

Home Office 1817-19 HOLMES ST., KANSAS CITY, MO.

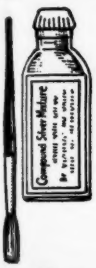
Branches:
CHICAGO
NEW YORK
SAN FRANCISCO
DALLAS
ALBANY, GA.
KENT, WASH.
LOS ANGELES
CHAMPAIGN, ILL.

ing sheep, were vaccinated with uniformly good results corresponding to the European experience. This vaccine is now marketed under the name of Carbozoo and it can now be reasonably expected that the devastating losses from anthrax in the anthrax districts of this country can be halted; and the terror to cattlemen of this disease can be made to seem a thing of the past, as has been the case with other epizöotic diseases for which specific vaccines have been perfected.

ATTENTION, SMALL ANIMAL SPECIALISTS

The next meeting of the American Animal Hospital Association will be held at the Palmer House, Chicago, Illinois, April 3-4, 1935. Among other features offered during two-day program will be a banquet the evening of the first day and a clinic on the afternoon of the second day. For further information, address the secretary, J. V. Lacroix, 1817 Church Street, Evanston, Illinois.

GUARANTEED TO GIVE SATISFACTION



M·A·C

ACCEPTED AND USED BY THE PROFESSION SINCE 1900

In the treatment of Splints, Spavins, Sidebones, Curbs, Inflamed Tendons, Bursal Lameness, etc.

"M. A. C. HAS NEVER BEEN SUCCESSFULLY IMITATED"

CARTER-LUFF CHEMICAL CO., HUDSON, N.Y.

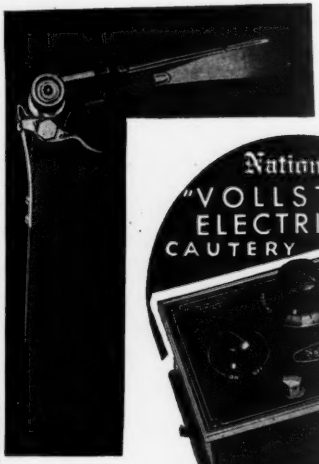
PRICES

SINGLE BOTTLE	$ 2.00
¼ DOZEN 1 BOTTLE FREE	5.00
½ DOZEN 2 BOTTLES FREE	8.00
1 DOZEN 4 BOTTLES FREE	15.00
2 DOZEN 4 BOTTLES FREE	25.00

FOR PRICES IN CANADA write to

Wingate Chemical Co.
Montreal

AGENTS SOUTHERN STATES
Kentucky Serum Co.
LOUISVILLE, KY.



Essential Equipment

for Bloodless, Aseptic Modern Veterinary Surgery

Large Animal Practice and Small Animal Clinic

National "VOLLSTEDT" ELECTRIC CAUTERY

Eliminates Hemorrhage and Infection

for: Polypi—Fibromas of Uterus—Cecetomies — Pyometras — Warts — Mammary, Melanotic, "Bull's Eye" Tumors — Castration—Point and Line Firing — Teat Fistulae —Cervical Cauterization.

National "Twin Control" Cautery with "Trigger" Handle and 3 tips
No. V 35 . . . $33.50

(Cautery Handle Illuminator Optional)

SEE YOUR DEALER
or
Write us for additional information

National Electric Instrument Co. 3616 SKILLMAN AVENUE L. I. CITY, N. Y.

HORSES *and* MULES

Are in demand for farm work. Horses and mules are selling for higher prices than for the past several years. Increased demand results in more sales and more traffic in horses and mules and facilitates the spread of strangles and shipping fever. These diseases are of considerable economic importance because of the serious handicap to the putting in of farm crops. Strangles, other streptococcic infections, and hemorrhagic septicemia are the most common diseases this season of the year.

It is not uncommon for all horses and mules on a farm to become affected with these diseases and thus cause suspension of all farm work. The prevention of these diseases is possible by the use of properly prepared bacterin. Because of the widespread occurrence of these maladies, it is advisable to treat all farm horses and mules before spring work begins. This kind of service will be appreciated by horse owners.

Kinsley's Influenza bacterin has been successfully used, not only on farms but also in public markets. One injection usually suffices as a preventative agent for unexposed animals. Two or more injections should be given to exposed animals.

Our Streptococcus bacterin is par-excellent in the control of colt strangles, and pyaemic arthritis bacterin is of value in controlling navel ill.

Write, telephone or telegraph.

KINSLEY LABORATORIES

1103 East 47th St. ∴ Kansas City, Missouri

D. L. Travis, age 60, died of carcinoma of the stomach, January 26, 1935. Doctor Travis was born at Pana, Illinois, graduated from the Chicago Veterinary College, class of '05, and settled at Vandalia, Illinois, following his graduation. At the time the doctor was stricken, he was employed as veterinarian at Colony No. 1, near Osceola, Arkansas, a national and state housing project for the unemployed. He is survived by his widow, one son, Dr. D. P. Travis of Herrin, Illinois, and a grandson.

Wagner's corpuscles and Wagner's spot (the germinal spot of an ovum) take their names from Rudolph Wagner (1805-64), German anatomist and physiologist.

PATTON BIOLOGICAL LABORATORIES

Formulas · Consultation
Biological Testing

"Dog, Cat, Fox Food Exclusively"

Address all correspondence to
DR. J. W. PATTON
P. O. Box 933 E. Lansing, Mich.

$1.00 Value Free

FREE! 4-OUNCE BOTTLE HARLTON'S LIQUID BLISTER—VALUE $1.00

How to Obtain: Just write and say you have never used or received a sample bottle of Harlton's Liquid Blister, using your professional letterhead or card. Upon receipt of your request one 4-oz. bottle of Harlton's Liquid Blister, value $1.00 . . . will be sent postpaid . . . without charge . . . for trial in your practice.

IMPORTANT NOTICE

This offer is only for Veterinarians who have never received a sample. Samples limited one to a customer.

DETROIT VETERINARY SUPPLY CO.
Detroit, Michigan Box 421 Windsor, Ontario

DR. R. C. FINKLE
VETERINARIAN
SEYMOUR -:- WISCONSIN

Oct. 1st, 1934.

"I am having very marked success in the treatment of various conditions with your liquid blister and like it very much, fact is I simply cannot be without it." R. C. Finkle.

"GREASY" HEELS

will sometimes affect horses that are obliged to work in very wet conditions, or who stand in muddy stables.

Following a thorough cleansing of the parts a daily dressing of hot Antiphlogistine is indicated. This not only helps to absorb the exudates, but to check them, and to bring about a healthy condition.

Sample on Request

ANTIPHLOGISTINE

Inflammation's Antidote

THE DENVER CHEMICAL MFG. CO.
163 Varick Street . . . . . New York, N. Y.

Jen-Sal

New Tags — New Certificates — New Post Cards

TO INCREASE YOUR RABIES VACCINATION SERVICE

supplied without cost to users of Jen-Sal Vaccine

Your Dog Should Be Vaccinated Against Rabies!
—for the sake of your family and neighbors as well as your dog.
Dear Friend—
Rabies (also and Hydrophobia) disease — in dog bite from an infec
Your respons owner demands the dog a safe dog.
VACCINATION
Consult your vete
Time to Vaccinate Your Dog Again
for
RABIES PROTECTION
Vaccination protects for one year. Your dog should be vaccinated before
1935.
D V M.
Rabies is incurable — in dogs or humans. Think of your family —
BE SAFE!
Vaccination Makes Your Dog a SAFE Playmate

JEN-SAL RABIES VACCINE is one of the most widely used of all Jen-Sal products—and for veterinarians who use Jen-Sal Vaccine this year a complete plan has been worked out to aid them in increasing their Rabies vaccination service.

Post cards to remind clients of time to vaccinate and to impress dog owners with the importance of vaccination—new, highly polished brass tags that catch the eye and please clients—neat, professional-looking certificates. All these are supplied without extra cost—you pay only for Jen-Sal Vaccine.

If you order 100 or more doses of Vaccine, we will supply tags and certificates that bear your own name.

★ ★ ★

SEND FOR FOLDER!

Full details about the plan, arranged so you can learn all about it in a few minutes. Also

SAMPLES

of the tags, certificates and post cards. WRITE!

JENSEN-SALSBERY LABORATORIES INC., KANSAS CITY, MO.

For the prevention of **Septic Conditions** before, during, and after an operation many Veterinarians prefer

THERAPOGEN

the one **Antiseptic** that is safe to use under all conditions.

SAMPLES AND LITERATURE SENT UPON REQUEST.

THEODORE MEYER, EST.

Mfg. Chemists

213 S. 10TH STREET **PHILADELPHIA, PA.**